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Yang, Yan-Ping
Klein, Michel H.

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<150> 08/613,009

<151> 1996-03-08

<150> 08/778,570

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<213> *Moraxella catarrhalis*

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<212> DNA

<213> Moraxella catarrhalis

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<213> Moraxella catarrhalis

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<211> 1074

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<213> Moraxella catarrhalis

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Gln	Gly	Asn	Asn	Leu	Gly	Glu	Arg	Ile	Arg	Asp	Thr	Ile	Gly	Pro	Asp
385					390					395					400
Ser	Gly	Tyr	Gly	Ile	Asn	Tyr	Ala	His	Gly	Val	Phe	Tyr	Asp	Glu	Lys
				405					410					415	
His	Gln	Lys	Asp	Arg	Leu	Gly	Leu	Glu	Tyr	Val	Tyr	Asp	Ser	Lys	Gly
			420					425					430		
Glu	Asn	Lys	Trp	Phe	Asp	Asp	Val	Arg	Val	Ser	Tyr	Asp	Lys	Gln	Asp
		435					440					445			
Ile	Thr	Leu	Arg	Ser	Gln	Leu	Thr	Asn	Thr	His	Cys	Ser	Thr	Tyr	Pro
450						455					460				
His	Ile	Asp	Lys	Asn	Cys	Thr	Pro	Asp	Val	Asn	Lys	Pro	Phe	Ser	Val
465					470					475					480
Lys	Glu	Val	Asp	Asn	Asn	Ala	Tyr	Lys	Glu	Gln	His	Asn	Leu	Ile	Lys
				485					490					495	
Ala	Val	Phe	Asn	Lys	Lys	Met	Ala	Leu	Gly	Ser	Thr	His	His	His	Ile
			500					505					510		

Asn	Leu	Gln	Val	Gly	Tyr	Asp	Lys	Phe	Asn	Ser	Ser	Leu	Ser	Arg	Glu
515						520						525			
Asp	Tyr	Arg	Leu	Ala	Thr	His	Gln	Ser	Tyr	Glu	Lys	Leu	Asp	Tyr	Thr
530						535						540			
Pro	Pro	Ser	Asn	Pro	Leu	Pro	Asp	Lys	Phe	Lys	Pro	Ile	Leu	Gly	Ser
545				550						555				560	
Asn	Asn	Lys	Pro	Ile	Cys	Leu	Asp	Ala	Tyr	Gly	Tyr	Gly	His	Asp	His
				565				570						575	
Pro	Gln	Ala	Cys	Asn	Ala	Lys	Asn	Ser	Thr	Tyr	Gln	Asn	Phe	Ala	Ile
		580						585				590			
Lys	Lys	Gly	Ile	Glu	Gln	Tyr	Asn	Gln	Lys	Thr	Asn	Thr	Asp	Lys	Ile
		595				600						605			
Asp	Tyr	Gln	Ala	Ile	Ile	Asp	Gln	Tyr	Asp	Lys	Gln	Asn	Pro	Asn	Ser
610						615						620			
Thr	Leu	Lys	Pro	Phe	Glu	Lys	Ile	Lys	Gln	Ser	Leu	Gly	Gln	Glu	Lys
625				630						635				640	
Tyr	Asn	Lys	Ile	Asp	Glu	Leu	Gly	Phe	Lys	Ala	Tyr	Lys	Asp	Leu	Arg
				645				650						655	
Asn	Glu	Trp	Ala	Gly	Trp	Thr	Asn	Asp	Asn	Ser	Gln	Gln	Asn	Ala	Asn
		660						665				670			
Lys	Gly	Thr	Asp	Asn	Ile	Tyr	Gln	Pro	Asn	Gln	Ala	Thr	Val	Val	Lys
		675				680						685			
Asp	Asp	Lys	Cys	Lys	Tyr	Ser	Glu	Thr	Asn	Ser	Tyr	Ala	Asp	Cys	Ser
690						695						700			
Thr	Thr	Ala	His	Ile	Ser	Gly	Asp	Asn	Tyr	Phe	Ile	Ala	Leu	Lys	Asp
705				710						715				720	
Asn	Met	Thr	Ile	Asn	Lys	Tyr	Val	Asp	Leu	Gly	Leu	Gly	Ala	Arg	Tyr
				725				730						735	
Asp	Arg	Ile	Lys	His	Lys	Ser	Asp	Val	Pro	Leu	Val	Asp	Asn	Ser	Ala
		740						745				750			
Ser	Asn	Gln	Leu	Ser	Trp	Asn	Phe	Gly	Val	Val	Val	Lys	Pro	Thr	Asn
755						760						765			
Trp	Leu	Asp	Ile	Ala	Tyr	Arg	Ser	Ser	Gln	Gly	Phe	Arg	Met	Pro	Ser
770						775						780			
Phe	Ser	Glu	Met	Tyr	Gly	Glu	Arg	Phe	Gly	Val	Thr	Ile	Gly	Lys	Gly
785				790						795				800	
Thr	Gln	His	Gly	Cys	Lys	Gly	Leu	Tyr	Tyr	Ile	Cys	Gln	Gln	Thr	Val
				805				810						815	

His Gln Thr Lys Leu Lys Pro Glu Lys Ser Phe Asn Gln Glu Ile Gly
 820 825 830
 Ala Thr Leu His Asn His Leu Gly Ser Leu Glu Val Ser Tyr Phe Lys
 835 840 845
 Asn Arg Tyr Thr Asp Leu Ile Val Gly Lys Ser Glu Glu Ile Arg Thr
 850 855 860
 Leu Thr Gln Gly Asp Asn Ala Gly Lys Gln Arg Gly Lys Gly Asp Leu
 865 870 875 880
 Gly Phe His Asn Gly Gln Asp Ala Asp Leu Thr Gly Ile Asn Ile Leu
 885 890 895
 Gly Arg Leu Asp Leu Asn Ala Val Asn Ser Arg Leu Pro Tyr Gly Leu
 900 905 910
 Tyr Ser Thr Leu Ala Tyr Asn Lys Val Asp Val Lys Gly Lys Thr Leu
 915 920 925
 Asn Pro Thr Leu Ala Gly Thr Asn Ile Leu Phe Asp Ala Ile Gln Pro
 930 935 940
 Ser Arg Tyr Val Val Gly Leu Gly Tyr Asp Ala Pro Ser Gln Lys Trp
 945 950 955 960
 Gly Ala Asn Ala Ile Phe Thr His Ser Asp Ala Lys Asn Pro Ser Glu
 965 970 975
 Leu Leu Ala Asp Lys Asn Leu Gly Asn Gly Asn Ile Gln Thr Lys Gln
 980 985 990
 Ala Thr Lys Ala Lys Ser Thr Pro Trp Gln Thr Leu Asp Leu Ser Gly
 995 1000 1005
 Tyr Val Asn Ile Lys Asp Asn Phe Thr Leu Arg Ala Gly Val Tyr Asn
 1010 1015 1020
 Val Phe Asn Thr Tyr Tyr Thr Thr Trp Glu Ala Leu Arg Gln Thr Ala
 1025 1030 1035 1040
 Glu Gly Ala Val Asn Gln His Thr Gly Leu Ser Gln Asp Lys His Tyr
 1045 1050 1055
 Gly Arg Tyr Ala Ala Pro Gly Arg Asn Tyr Gln Leu Ala Leu Glu Met
 1060 1065 1070
 Lys Phe

<210> 10

<211> 1053

<212> PRT

<213> Moraxella catarrhalis

<400> 10

Leu	Ser	Leu	Gly	Leu	Leu	Asn	Ile	Thr	Gln	Val	Ala	Leu	Ala	Asn	Thr	1	5	10	15
Thr	Ala	Asp	Lys	Ala	Glu	Ala	Thr	Asp	Lys	Thr	Asn	Leu	Val	Val	Val	20	25	30	
Leu	Asp	Glu	Thr	Val	Val	Thr	Ala	Lys	Lys	Asn	Ala	Arg	Lys	Ala	Asn	35	40	45	
Glu	Val	Thr	Gly	Leu	Gly	Lys	Val	Val	Lys	Thr	Ala	Glu	Thr	Ile	Asn	50	55	60	
Lys	Glu	Gln	Val	Leu	Asn	Ile	Arg	Asp	Leu	Thr	Arg	Tyr	Asp	Pro	Gly	65	70	75	80
Ile	Ala	Val	Val	Glu	Gln	Gly	Arg	Gly	Ala	Ser	Ser	Gly	Tyr	Ser	Ile	85	90	95	
Arg	Gly	Met	Asp	Lys	Asn	Arg	Val	Ala	Val	Leu	Val	Asp	Gly	Ile	Asn	100	105	110	
Gln	Ala	Gln	His	Tyr	Ala	Leu	Gln	Gly	Pro	Val	Ala	Gly	Lys	Asn	Tyr	115	120	125	
Ala	Ala	Gly	Gly	Ala	Ile	Asn	Glu	Ile	Glu	Tyr	Glu	Asn	Val	Arg	Ser	130	135	140	
Val	Glu	Ile	Ser	Lys	Gly	Ala	Asn	Ser	Ser	Glu	Tyr	Gly	Ser	Gly	Ala	145	150	155	160
Leu	Ser	Gly	Ser	Val	Ala	Phe	Val	Thr	Lys	Thr	Ala	Asp	Asp	Ile	Ile	165	170	175	
Lys	Asp	Gly	Lys	Asp	Trp	Gly	Val	Gln	Thr	Lys	Thr	Ala	Tyr	Ala	Ser	180	185	190	
Lys	Asn	Asn	Ala	Trp	Val	Asn	Ser	Val	Ala	Ala	Ala	Gly	Lys	Ala	Gly	195	200	205	
Ser	Phe	Ser	Gly	Leu	Ile	Ile	Tyr	Thr	Asp	Arg	Arg	Gly	Gln	Glu	Tyr	210	215	220	
Lys	Ala	His	Asp	Asp	Ala	Tyr	Gln	Gly	Ser	Gln	Ser	Phe	Asp	Arg	Ala	225	230	235	240
Val	Ala	Thr	Thr	Asp	Pro	Asn	Asn	Arg	Thr	Phe	Leu	Ile	Ala	Asn	Glu	245	250	255	
Cys	Ala	Asn	Gly	Asn	Tyr	Glu	Ala	Cys	Ala	Ala	Gly	Gly	Gln	Thr	Lys	260	265	270	
Leu	Gln	Ala	Lys	Pro	Thr	Asn	Val	Arg	Asp	Lys	Val	Asn	Val	Lys	Asp	275	280	285	
Tyr	Thr	Gly	Pro	Asn	Arg	Leu	Ile	Pro	Asn	Pro	Leu	Thr	Gln	Asp	Ser	290	295	300	

Lys Ser Leu Leu Leu Arg Pro Gly Tyr Gln Leu Asn Asp Lys His Tyr
 305 310 315 320
 Val Gly Gly Val Tyr Glu Ile Thr Lys Gln Asn Tyr Ala Met Gln Asp
 325 330 335
 Lys Thr Val Pro Ala Tyr Leu Thr Val His Asp Ile Glu Lys Ser Arg
 340 345 350
 Leu Ser Asn His Ala Gln Ala Asn Gly Tyr Tyr Gln Gly Asn Asn Leu
 355 360 365
 Gly Glu Arg Ile Arg Asp Thr Ile Gly Pro Asp Ser Gly Tyr Gly Ile
 370 375 380
 Asn Tyr Ala His Gly Val Phe Tyr Asp Glu Lys His Gln Lys Asp Arg
 385 390 395 400
 Leu Gly Leu Glu Tyr Val Tyr Asp Ser Lys Gly Glu Asn Lys Trp Phe
 405 410 415
 Asp Asp Val Arg Val Ser Tyr Asp Lys Gln Asp Ile Thr Leu Arg Ser
 420 425 430
 Gln Leu Thr Asn Thr His Cys Ser Thr Tyr Pro His Ile Asp Lys Asn
 435 440 445
 Cys Thr Pro Asp Val Asn Lys Pro Phe Ser Val Lys Glu Val Asp Asn
 450 455 460
 Asn Ala Tyr Lys Glu Gln His Asn Leu Ile Lys Ala Val Phe Asn Lys
 465 470 475 480
 Lys Met Ala Leu Gly Ser Thr His His His Ile Asn Leu Gln Val Gly
 485 490 495
 Tyr Asp Lys Phe Asn Ser Ser Leu Ser Arg Glu Asp Tyr Arg Leu Ala
 500 505 510
 Thr His Gln Ser Tyr Glu Lys Leu Asp Tyr Thr Pro Pro Ser Asn Pro
 515 520 525
 Leu Pro Asp Lys Phe Lys Pro Ile Leu Gly Ser Asn Asn Lys Pro Ile
 530 535 540
 Cys Leu Asp Ala Tyr Gly Tyr Gly His Asp His Pro Gln Ala Cys Asn
 545 550 555 560
 Ala Lys Asn Ser Thr Tyr Gln Asn Phe Ala Ile Lys Lys Gly Ile Glu
 565 570 575
 Gln Tyr Asn Gln Lys Thr Asn Thr Asp Lys Ile Asp Tyr Gln Ala Ile
 580 585 590
 Ile Asp Gln Tyr Asp Lys Gln Asn Pro Asn Ser Thr Leu Lys Pro Phe
 595 600 605
 Glu Lys Ile Lys Gln Ser Leu Gly Gln Glu Lys Tyr Asn Lys Ile Asp
 610 615 620

Glu	Leu	Gly	Phe	Lys	Ala	Tyr	Lys	Asp	Leu	Arg	Asn	Glu	Trp	Ala	Gly	
625					630					635					640	
Trp	Thr	Asn	Asp	Asn	Ser	Gln	Gln	Asn	Ala	Asn	Lys	Gly	Thr	Asp	Asn	
				645					650					655		
Ile	Tyr	Gln	Pro	Asn	Gln	Ala	Thr	Val	Val	Lys	Asp	Asp	Lys	Cys	Lys	
			660					665					670			
Tyr	Ser	Glu	Thr	Asn	Ser	Tyr	Ala	Asp	Cys	Ser	Thr	Thr	Ala	His	Ile	
		675					680					685				
Ser	Gly	Asp	Asn	Tyr	Phe	Ile	Ala	Leu	Lys	Asp	Asn	Met	Thr	Ile	Asn	
	690					695					700					
Lys	Tyr	Val	Asp	Leu	Gly	Leu	Gly	Ala	Arg	Tyr	Asp	Arg	Ile	Lys	His	
705					710					715					720	
Lys	Ser	Asp	Val	Pro	Leu	Val	Asp	Asn	Ser	Ala	Ser	Asn	Gln	Leu	Ser	
				725					730					735		
Trp	Asn	Phe	Gly	Val	Val	Val	Lys	Pro	Thr	Asn	Trp	Leu	Asp	Ile	Ala	
			740					745					750			
Tyr	Arg	Ser	Ser	Gln	Gly	Phe	Arg	Met	Pro	Ser	Phe	Ser	Glu	Met	Tyr	
		755					760					765				
Gly	Glu	Arg	Phe	Gly	Val	Thr	Ile	Gly	Lys	Gly	Thr	Gln	His	Gly	Cys	
	770					775					780					
Lys	Gly	Leu	Tyr	Tyr	Ile	Cys	Gln	Gln	Thr	Val	His	Gln	Thr	Lys	Leu	
785					790					795					800	
Lys	Pro	Glu	Lys	Ser	Phe	Asn	Gln	Glu	Ile	Gly	Ala	Thr	Leu	His	Asn	
				805					810					815		
His	Leu	Gly	Ser	Leu	Glu	Val	Ser	Tyr	Phe	Lys	Asn	Arg	Tyr	Thr	Asp	
			820					825					830			
Leu	Ile	Val	Gly	Lys	Ser	Glu	Glu	Ile	Arg	Thr	Leu	Thr	Gln	Gly	Asp	
		835					840					845				
Asn	Ala	Gly	Lys	Gln	Arg	Gly	Lys	Gly	Asp	Leu	Gly	Phe	His	Asn	Gly	
	850					855					860					
Gln	Asp	Ala	Asp	Leu	Thr	Gly	Ile	Asn	Ile	Leu	Gly	Arg	Leu	Asp	Leu	
865					870					875					880	
Asn	Ala	Val	Asn	Ser	Arg	Leu	Pro	Tyr	Gly	Leu	Tyr	Ser	Thr	Leu	Ala	
				885					890					895		
Tyr	Asn	Lys	Val	Asp	Val	Lys	Gly	Lys	Thr	Leu	Asn	Pro	Thr	Leu	Ala	
			900					905					910			
Gly	Thr	Asn	Ile	Leu	Phe	Asp	Ala	Ile	Gln	Pro	Ser	Arg	Tyr	Val	Val	
		915					920					925				

Gly Leu Gly Tyr Asp Ala Pro Ser Gln Lys Trp Gly Ala Asn Ala Ile
 930 935 940

Phe Thr His Ser Asp Ala Lys Asn Pro Ser Glu Leu Leu Ala Asp Lys
 945 950 955 960

Asn Leu Gly Asn Gly Asn Ile Gln Thr Lys Gln Ala Thr Lys Ala Lys
 965 970 975

Ser Thr Pro Trp Gln Thr Leu Asp Leu Ser Gly Tyr Val Asn Ile Lys
 980 985 990

Asp Asn Phe Thr Leu Arg Ala Gly Val Tyr Asn Val Phe Asn Thr Tyr
 995 1000 1005

Tyr Thr Thr Trp Glu Ala Leu Arg Gln Thr Ala Glu Gly Ala Val Asn
 1010 1015 1020

Gln His Thr Gly Leu Ser Gln Asp Lys His Tyr Gly Arg Tyr Ala Ala
 1025 1030 1035 1040

Pro Gly Arg Asn Tyr Gln Leu Ala Leu Glu Met Lys Phe
 1045 1050

<210> 11

<211> 702

<212> PRT

<213> Moraxella catarrhalis

<400> 11

Met Lys His Ile Pro Leu Thr Thr Leu Cys Val Ala Ile Ser Ala Val
 1 5 10 15

Leu Leu Thr Ala Cys Gly Gly Ser Gly Gly Ser Asn Pro Pro Ala Pro
 20 25 30

Thr Pro Ile Pro Asn Ala Ser Gly Ser Gly Asn Thr Gly Asn Thr Gly
 35 40 45

Asn Ala Gly Gly Thr Asp Asn Thr Ala Asn Ala Gly Asn Thr Gly Gly
 50 55 60

Thr Asn Ser Gly Thr Gly Ser Ala Asn Thr Pro Glu Pro Lys Tyr Gln
 65 70 75 80

Asp Val Pro Thr Glu Lys Asn Glu Lys Asp Lys Val Ser Ser Ile Gln
 85 90 95

Glu Pro Ala Met Gly Tyr Gly Met Ala Leu Ser Lys Ile Asn Leu His
 100 105 110

Asn Arg Gln Asp Thr Pro Leu Asp Glu Lys Asn Ile Ile Thr Leu Asp
 115 120 125

Gly Lys Lys Gln Val Ala Glu Gly Lys Lys Ser Pro Leu Pro Phe Ser
 130 135 140

Leu	Asp	Val	Glu	Asn	Lys	Leu	Leu	Asp	Gly	Tyr	Ile	Ala	Lys	Met	Asn	
145					150					155					160	
Val	Ala	Asp	Lys	Asn	Ala	Ile	Gly	Asp	Arg	Ile	Lys	Lys	Gly	Asn	Lys	
				165					170					175		
Glu	Ile	Ser	Asp	Glu	Glu	Leu	Ala	Lys	Gln	Ile	Lys	Glu	Ala	Val	Arg	
			180					185					190			
Lys	Ser	His	Glu	Phe	Gln	Gln	Val	Leu	Ser	Ser	Leu	Glu	Asn	Lys	Ile	
		195					200						205			
Phe	His	Ser	Asn	Asp	Gly	Thr	Thr	Lys	Ala	Thr	Thr	Arg	Asp	Leu	Lys	
	210					215					220					
Tyr	Val	Asp	Tyr	Gly	Tyr	Tyr	Leu	Ala	Asn	Asp	Gly	Asn	Tyr	Leu	Thr	
225					230					235					240	
Val	Lys	Thr	Asp	Lys	Leu	Trp	Asn	Leu	Gly	Pro	Val	Gly	Gly	Val	Phe	
				245					250					255		
Tyr	Asn	Gly	Thr	Thr	Thr	Ala	Lys	Glu	Leu	Pro	Thr	Gln	Asp	Ala	Val	
			260					265					270			
Lys	Tyr	Lys	Gly	His	Trp	Asp	Phe	Met	Thr	Asp	Val	Ala	Asn	Arg	Arg	
		275					280					285				
Asn	Arg	Phe	Ser	Glu	Val	Lys	Glu	Asn	Ser	Gln	Ala	Gly	Trp	Tyr	Tyr	
	290					295					300					
Gly	Ala	Ser	Ser	Lys	Asp	Glu	Tyr	Asn	Arg	Leu	Leu	Thr	Lys	Glu	Asp	
305					310					315					320	
Ser	Ala	Pro	Asp	Gly	His	Ser	Gly	Glu	Tyr	Gly	His	Ser	Ser	Glu	Phe	
				325					330					335		
Thr	Val	Asn	Phe	Lys	Glu	Lys	Lys	Leu	Thr	Gly	Lys	Leu	Phe	Ser	Asn	
			340					345					350			
Leu	Gln	Asp	Arg	His	Lys	Gly	Asn	Val	Thr	Lys	Thr	Glu	Arg	Tyr	Asp	
		355					360					365				
Ile	Asp	Ala	Asn	Ile	His	Gly	Asn	Arg	Phe	Arg	Gly	Ser	Ala	Thr	Ala	
	370					375					380					
Ser	Asn	Lys	Asn	Asp	Thr	Ser	Lys	His	Pro	Phe	Thr	Ser	Asp	Ala	Asn	
385					390					395					400	
Asn	Arg	Leu	Glu	Gly	Gly	Phe	Tyr	Gly	Pro	Lys	Gly	Glu	Glu	Leu	Ala	
				405					410					415		
Gly	Lys	Phe	Leu	Thr	Asn	Asp	Asn	Lys	Leu	Phe	Gly	Val	Phe	Gly	Ala	
			420					425					430			
Lys	Arg	Glu	Ser	Lys	Ala	Glu	Glu	Lys	Thr	Glu	Ala	Ile	Leu	Asp	Ala	
		435					440					445				

Tyr Ala Leu Gly Thr Phe Asn Thr Ser Asn Ala Thr Thr Phe Thr Pro
 450 455 460
 Phe Thr Glu Lys Gln Leu Asp Asn Phe Gly Asn Ala Lys Lys Leu Val
 465 470 475 480
 Leu Gly Ser Thr Val Ile Asp Leu Val Pro Thr Asp Ala Thr Lys Asn
 485 490 495
 Glu Phe Thr Lys Asp Lys Pro Glu Ser Ala Thr Asn Glu Ala Gly Glu
 500 505 510
 Thr Leu Met Val Asn Asp Glu Val Ser Val Lys Thr Tyr Gly Lys Asn
 515 520 525
 Phe Glu Tyr Leu Lys Phe Gly Glu Leu Ser Ile Gly Gly Ser His Ser
 530 535 540
 Val Phe Leu Gln Gly Glu Arg Thr Ala Thr Thr Gly Glu Lys Ala Val
 545 550 555 560
 Pro Thr Thr Gly Thr Ala Lys Tyr Leu Gly Asn Trp Val Gly Tyr Ile
 565 570 575
 Thr Gly Lys Asp Thr Gly Thr Gly Thr Gly Lys Ser Phe Thr Asp Ala
 580 585 590
 Gln Asp Val Ala Asp Phe Asp Ile Asp Phe Gly Asn Lys Ser Val Ser
 595 600 605
 Gly Lys Leu Ile Thr Lys Gly Arg Gln Asp Pro Val Phe Ser Ile Thr
 610 615 620
 Gly Gln Ile Ala Gly Asn Gly Trp Thr Gly Thr Ala Ser Thr Thr Lys
 625 630 635 640
 Ala Asp Ala Gly Gly Tyr Lys Ile Asp Ser Ser Ser Thr Gly Lys Ser
 645 650 655
 Ile Ala Ile Lys Asp Ala Asn Val Thr Gly Gly Phe Tyr Gly Pro Asn
 660 665 670
 Ala Asn Glu Met Gly Gly Ser Phe Thr His Asn Ala Asp Asp Ser Lys
 675 680 685
 Ala Ser Val Val Phe Gly Thr Lys Arg Gln Gln Glu Val Lys
 690 695 700

<210> 12
 <211> 682
 <212> PRT
 <213> Moraxella catarrhalis

<400> 12
 Cys Gly Gly Ser Gly Gly Ser Asn Pro Pro Ala Pro Thr Pro Ile Pro
 1 5 10 15

Asn	Ala	Ser	Gly	Ser	Gly	Asn	Thr	Gly	Asn	Thr	Gly	Asn	Ala	Gly	Gly		
			20					25					30				
Thr	Asp	Asn	Thr	Ala	Asn	Ala	Gly	Asn	Thr	Gly	Gly	Thr	Asn	Ser	Gly		
		35					40					45					
Thr	Gly	Ser	Ala	Asn	Thr	Pro	Glu	Pro	Lys	Tyr	Gln	Asp	Val	Pro	Thr		
	50					55					60						
Glu	Lys	Asn	Glu	Lys	Asp	Lys	Val	Ser	Ser	Ile	Gln	Glu	Pro	Ala	Met		
65					70					75					80		
Gly	Tyr	Gly	Met	Ala	Leu	Ser	Lys	Ile	Asn	Leu	His	Asn	Arg	Gln	Asp		
				85					90					95			
Thr	Pro	Leu	Asp	Glu	Lys	Asn	Ile	Ile	Thr	Leu	Asp	Gly	Lys	Lys	Gln		
			100					105					110				
Val	Ala	Glu	Gly	Lys	Lys	Ser	Pro	Leu	Pro	Phe	Ser	Leu	Asp	Val	Glu		
		115					120					125					
Asn	Lys	Leu	Leu	Asp	Gly	Tyr	Ile	Ala	Lys	Met	Asn	Val	Ala	Asp	Lys		
	130					135					140						
Asn	Ala	Ile	Gly	Asp	Arg	Ile	Lys	Lys	Gly	Asn	Lys	Glu	Ile	Ser	Asp		
145					150					155					160		
Glu	Glu	Leu	Ala	Lys	Gln	Ile	Lys	Glu	Ala	Val	Arg	Lys	Ser	His	Glu		
				165					170					175			
Phe	Gln	Gln	Val	Leu	Ser	Ser	Leu	Glu	Asn	Lys	Ile	Phe	His	Ser	Asn		
			180					185					190				
Asp	Gly	Thr	Thr	Lys	Ala	Thr	Thr	Arg	Asp	Leu	Lys	Tyr	Val	Asp	Tyr		
		195					200					205					
Gly	Tyr	Tyr	Leu	Ala	Asn	Asp	Gly	Asn	Tyr	Leu	Thr	Val	Lys	Thr	Asp		
	210				215						220						
Lys	Leu	Trp	Asn	Leu	Gly	Pro	Val	Gly	Gly	Val	Phe	Tyr	Asn	Gly	Thr		
225					230					235					240		
Thr	Thr	Ala	Lys	Glu	Leu	Pro	Thr	Gln	Asp	Ala	Val	Lys	Tyr	Lys	Gly		
				245					250					255			
His	Trp	Asp	Phe	Met	Thr	Asp	Val	Ala	Asn	Arg	Arg	Asn	Arg	Phe	Ser		
			260					265					270				
Glu	Val	Lys	Glu	Asn	Ser	Gln	Ala	Gly	Trp	Tyr	Tyr	Gly	Ala	Ser	Ser		
		275					280					285					
Lys	Asp	Glu	Tyr	Asn	Arg	Leu	Leu	Thr	Lys	Glu	Asp	Ser	Ala	Pro	Asp		
	290					295					300						
Gly	His	Ser	Gly	Glu	Tyr	Gly	His	Ser	Ser	Glu	Phe	Thr	Val	Asn	Phe		
305					310					315					320		
Lys	Glu	Lys	Lys	Leu	Thr	Gly	Lys	Leu	Phe	Ser	Asn	Leu	Gln	Asp	Arg		
				325					330					335			

His	Lys	Gly	Asn	Val	Thr	Lys	Thr	Glu	Arg	Tyr	Asp	Ile	Asp	Ala	Asn	
			340					345					350			
Ile	His	Gly	Asn	Arg	Phe	Arg	Gly	Ser	Ala	Thr	Ala	Ser	Asn	Lys	Asn	
		355					360					365				
Asp	Thr	Ser	Lys	His	Pro	Phe	Thr	Ser	Asp	Ala	Asn	Asn	Arg	Leu	Glu	
	370					375					380					
Gly	Gly	Phe	Tyr	Gly	Pro	Lys	Gly	Glu	Glu	Leu	Ala	Gly	Lys	Phe	Leu	
385					390					395					400	
Thr	Asn	Asp	Asn	Lys	Leu	Phe	Gly	Val	Phe	Gly	Ala	Lys	Arg	Glu	Ser	
				405					410					415		
Lys	Ala	Glu	Glu	Lys	Thr	Glu	Ala	Ile	Leu	Asp	Ala	Tyr	Ala	Leu	Gly	
			420					425						430		
Thr	Phe	Asn	Thr	Ser	Asn	Ala	Thr	Thr	Phe	Thr	Pro	Phe	Thr	Glu	Lys	
		435					440					445				
Gln	Leu	Asp	Asn	Phe	Gly	Asn	Ala	Lys	Lys	Leu	Val	Leu	Gly	Ser	Thr	
	450					455					460					
Val	Ile	Asp	Leu	Val	Pro	Thr	Asp	Ala	Thr	Lys	Asn	Glu	Phe	Thr	Lys	
465					470					475					480	
Asp	Lys	Pro	Glu	Ser	Ala	Thr	Asn	Glu	Ala	Gly	Glu	Thr	Leu	Met	Val	
				485					490					495		
Asn	Asp	Glu	Val	Ser	Val	Lys	Thr	Tyr	Gly	Lys	Asn	Phe	Glu	Tyr	Leu	
			500					505					510			
Lys	Phe	Gly	Glu	Leu	Ser	Ile	Gly	Gly	Ser	His	Ser	Val	Phe	Leu	Gln	
		515					520					525				
Gly	Glu	Arg	Thr	Ala	Thr	Thr	Gly	Glu	Lys	Ala	Val	Pro	Thr	Thr	Gly	
	530					535						540				
Thr	Ala	Lys	Tyr	Leu	Gly	Asn	Trp	Val	Gly	Tyr	Ile	Thr	Gly	Lys	Asp	
545					550					555					560	
Thr	Gly	Thr	Gly	Thr	Gly	Lys	Ser	Phe	Thr	Asp	Ala	Gln	Asp	Val	Ala	
				565					570					575		
Asp	Phe	Asp	Ile	Asp	Phe	Gly	Asn	Lys	Ser	Val	Ser	Gly	Lys	Leu	Ile	
			580					585					590			
Thr	Lys	Gly	Arg	Gln	Asp	Pro	Val	Phe	Ser	Ile	Thr	Gly	Gln	Ile	Ala	
		595					600					605				
Gly	Asn	Gly	Trp	Thr	Gly	Thr	Ala	Ser	Thr	Thr	Lys	Ala	Asp	Ala	Gly	
	610					615					620					
Gly	Tyr	Lys	Ile	Asp	Ser	Ser	Ser	Thr	Gly	Lys	Ser	Ile	Ala	Ile	Lys	
625					630					635					640	

Asp Ala Asn Val Thr Gly Gly Phe Tyr Gly Pro Asn Ala Asn Glu Met
 645 650 655

Gly Gly Ser Phe Thr His Asn Ala Asp Asp Ser Lys Ala Ser Val Val
 660 665 670

Phe Gly Thr Lys Arg Gln Gln Glu Val Lys
 675 680

<210> 13

<211> 1070

<212> PRT

<213> Moraxella catarrhalis

<400> 13

Met Asn Gln Ser Lys Lys Ser Lys Lys Ser Lys Gln Val Leu Lys Leu
 1 5 10 15

Ser Ala Leu Ser Leu Gly Leu Leu Asn Ile Thr Gln Val Ala Leu Ala
 20 25 30

Asn Thr Thr Ala Asp Lys Ala Glu Ala Thr Asp Lys Thr Asn Leu Val
 35 40 45

Val Val Leu Asp Glu Thr Val Val Thr Ala Lys Lys Asn Ala Arg Lys
 50 55 60

Ala Asn Glu Val Thr Gly Leu Gly Lys Val Val Lys Thr Ala Glu Thr
 65 70 75 80

Ile Asn Lys Glu Gln Val Leu Asn Ile Arg Asp Leu Thr Arg Tyr Asp
 85 90 95

Pro Gly Ile Ala Val Val Glu Gln Gly Arg Gly Ala Ser Ser Gly Tyr
 100 105 110

Ser Ile Arg Gly Met Asp Lys Asn Arg Val Ala Val Leu Val Asp Gly
 115 120 125

Ile Asn Gln Ala Gln His Tyr Ala Leu Gln Gly Pro Val Ala Gly Lys
 130 135 140

Asn Tyr Ala Ala Gly Gly Ala Ile Asn Glu Ile Glu Tyr Glu Asn Val
 145 150 155 160

Arg Ser Val Glu Ile Ser Lys Gly Ala Asn Ser Ser Glu Tyr Gly Ser
 165 170 175

Gly Ala Leu Ser Gly Ser Val Ala Phe Val Thr Lys Thr Ala Asp Asp
 180 185 190

Ile Ile Lys Asp Gly Lys Asp Trp Gly Val Gln Thr Lys Thr Ala Tyr
 195 200 205

Ala Ser Lys Asn Asn Ala Trp Val Asn Ser Val Ala Ala Ala Gly Lys
 210 215 220

Ala	Gly	Ser	Phe	Ser	Gly	Leu	Ile	Ile	Tyr	Thr	Asp	Arg	Arg	Gly	Gln	225	230	235	240
Glu	Tyr	Lys	Ala	His	Asp	Asp	Ala	Tyr	Gln	Gly	Ser	Gln	Ser	Phe	Asp	245	250	255	
Arg	Ala	Val	Ala	Thr	Thr	Asp	Pro	Asn	Asn	Pro	Lys	Phe	Leu	Ile	Ala	260	265	270	
Asn	Glu	Cys	Ala	Asn	Gly	Asn	Tyr	Glu	Ala	Cys	Ala	Ala	Gly	Gly	Gln	275	280	285	
Thr	Lys	Leu	Gln	Ala	Lys	Pro	Thr	Asn	Val	Arg	Asp	Lys	Val	Asn	Val	290	295	300	
Lys	Asp	Tyr	Thr	Gly	Pro	Asn	Arg	Leu	Ile	Pro	Asn	Pro	Leu	Thr	Gln	305	310	315	320
Asp	Ser	Lys	Ser	Leu	Leu	Leu	Arg	Pro	Gly	Tyr	Gln	Leu	Asn	Asp	Lys	325	330	335	
His	Tyr	Val	Gly	Gly	Val	Tyr	Glu	Ile	Thr	Lys	Gln	Asn	Tyr	Ala	Met	340	345	350	
Gln	Asp	Lys	Thr	Val	Pro	Ala	Tyr	Leu	Thr	Val	His	Asp	Ile	Glu	Lys	355	360	365	
Ser	Arg	Leu	Ser	Asn	His	Gly	Gln	Ala	Asn	Gly	Tyr	Tyr	Gln	Gly	Asn	370	375	380	
Asn	Leu	Gly	Glu	Arg	Ile	Arg	Asp	Ala	Ile	Gly	Ala	Asn	Ser	Gly	Tyr	385	390	395	400
Gly	Ile	Asn	Tyr	Ala	His	Gly	Val	Phe	Tyr	Asp	Glu	Lys	His	Gln	Lys	405	410	415	
Asp	Arg	Leu	Gly	Leu	Glu	Tyr	Val	Tyr	Asp	Ser	Lys	Gly	Glu	Asn	Lys	420	425	430	
Trp	Phe	Asp	Asp	Val	Arg	Val	Ser	Tyr	Asp	Lys	Gln	Asp	Ile	Thr	Leu	435	440	445	
Arg	Ser	Gln	Leu	Thr	Asn	Thr	His	Cys	Ser	Thr	Tyr	Pro	His	Ile	Asp	450	455	460	
Lys	Asn	Cys	Thr	Pro	Asp	Val	Asn	Lys	Pro	Phe	Ser	Val	Lys	Glu	Val	465	470	475	480
Asp	Asn	Asn	Ala	Tyr	Lys	Glu	Gln	His	Asn	Leu	Ile	Lys	Ala	Val	Phe	485	490	495	
Asn	Lys	Lys	Met	Ala	Leu	Gly	Asn	Thr	His	His	His	Ile	Asn	Leu	Gln	500	505	510	
Val	Gly	Tyr	Asp	Lys	Phe	Asn	Ser	Leu	Ser	Arg	Glu	Asp	Tyr	Arg		515	520	525	
Leu	Ala	Thr	His	Gln	Ser	Tyr	Gln	Lys	Leu	Asp	Tyr	Thr	Pro	Pro	Ser	530	535	540	

Asn	Pro	Leu	Pro	Asp	Lys	Phe	Lys	Pro	Ile	Leu	Gly	Ser	Asn	Asn	Arg	
545					550					555					560	
Pro	Ile	Cys	Leu	Asp	Ala	Tyr	Gly	Tyr	Gly	His	Asp	His	Pro	Gln	Ala	
				565					570					575		
Cys	Asn	Ala	Lys	Asn	Ser	Thr	Tyr	Gln	Asn	Phe	Ala	Ile	Lys	Lys	Gly	
			580					585					590			
Ile	Glu	Gln	Tyr	Asn	Gln	Thr	Asn	Thr	Asp	Lys	Ile	Asp	Tyr	Gln	Ala	
		595					600					605				
Val	Ile	Asp	Gln	Tyr	Asp	Lys	Gln	Asn	Pro	Asn	Ser	Thr	Leu	Lys	Pro	
	610					615					620					
Phe	Glu	Lys	Ile	Lys	Gln	Ser	Leu	Gly	Gln	Glu	Lys	Tyr	Asp	Glu	Ile	
625					630					635					640	
Asp	Arg	Leu	Gly	Phe	Asn	Ala	Tyr	Lys	Asp	Leu	Arg	Asn	Glu	Trp	Ala	
				645					650					655		
Gly	Trp	Thr	Asn	Asp	Asn	Ser	Gln	Gln	Asn	Ala	Asn	Lys	Gly	Thr	Asp	
			660					665					670			
Asn	Ile	Tyr	Gln	Pro	Asn	Gln	Ala	Thr	Val	Val	Lys	Asp	Asp	Lys	Cys	
	675					680						685				
Lys	Tyr	Ser	Glu	Thr	Asn	Ser	Tyr	Ala	Asp	Cys	Ser	Thr	Thr	Arg	His	
	690					695					700					
Ile	Ser	Gly	Asp	Asn	Tyr	Phe	Ile	Ala	Leu	Lys	Asp	Asn	Met	Thr	Ile	
705				710						715					720	
Asn	Lys	Tyr	Val	Asp	Leu	Gly	Leu	Gly	Ala	Arg	Tyr	Asp	Arg	Ile	Lys	
				725					730					735		
His	Lys	Ser	Asp	Val	Pro	Leu	Val	Asp	Asn	Ser	Ala	Ser	Asn	Gln	Leu	
			740					745					750			
Ser	Trp	Asn	Phe	Gly	Val	Val	Val	Lys	Pro	Thr	Asn	Trp	Leu	Asp	Ile	
		755					760					765				
Ala	Tyr	Arg	Ser	Ser	Gln	Gly	Phe	Arg	Met	Pro	Ser	Phe	Ser	Glu	Met	
	770					775					780					
Tyr	Gly	Glu	Arg	Phe	Gly	Val	Thr	Ile	Gly	Lys	Gly	Thr	Gln	His	Gly	
785					790					795					800	
Cys	Lys	Gly	Leu	Tyr	Tyr	Ile	Cys	Gln	Gln	Thr	Val	His	Gln	Thr	Lys	
			805						810					815		
Leu	Lys	Pro	Glu	Lys	Ser	Phe	Asn	Gln	Glu	Ile	Gly	Ala	Thr	Leu	His	
			820					825					830			
Asn	His	Leu	Gly	Ser	Leu	Glu	Val	Ser	Tyr	Phe	Lys	Asn	Arg	Tyr	Thr	
		835					840					845				

Asp Leu Ile Val Gly Lys Ser Glu Glu Ile Arg Thr Leu Thr Gln Gly
 850 855 860

Asp Asn Ala Gly Lys Gln Arg Gly Lys Gly Asp Leu Gly Phe His Asn
 865 870 875 880

Gly Gln Asp Ala Asp Leu Thr Gly Ile Asn Ile Leu Gly Arg Leu Asp
 885 890 895

Leu Asn Ala Val Asn Ser Arg Leu Pro Tyr Gly Leu Tyr Ser Thr Leu
 900 905 910

Ala Tyr Asn Lys Val Asp Val Lys Gly Lys Thr Leu Asn Pro Thr Leu
 915 920 925

Ala Gly Thr Asn Ile Leu Phe Asp Ala Ile Gln Pro Ser Arg Tyr Val
 930 935 940

Val Gly Leu Gly Tyr Asp Ala Pro Ser Gln Lys Trp Gly Ala Asn Ala
 945 950 955 960

Ile Phe Thr His Ser Asp Ala Lys Asn Pro Ser Glu Leu Leu Ala Asp
 965 970 975

Lys Asn Leu Gly Asn Gly Asn Asn Gln Thr Lys Gln Ala Thr Lys Ala
 980 985 990

Lys Ser Thr Pro Trp Gln Thr Leu Asp Leu Ser Gly Tyr Val Asn Ile
 995 1000 1005

Lys Asp Asn Phe Thr Leu Arg Ala Gly Val Tyr Asn Val Phe Asn Thr
 1010 1015 1020

Tyr Tyr Thr Thr Trp Glu Ala Leu Arg Gln Thr Ala Glu Gly Ala Val
 1025 1030 1035 1040

Asn Gln His Thr Gly Leu Ser Gln Asp Lys His Tyr Gly Arg Tyr Ala
 1045 1050 1055

Ala Pro Gly Arg Asn Tyr Gln Leu Ala Leu Glu Met Lys Phe
 1060 1065 1070

<210> 14

<211> 17

<212> PRT

<213> Moraxella catarrhalis

<400> 14

Asn Gln Ser Lys Lys Ser Lys Lys Ser Lys Gln Val Leu Lys Leu Ser
 1 5 10 15

Ala

<210> 15

<211> 709

<212> PRT

<213> Moraxella catarrhalis

<400> 15

Met	Lys	His	Ile	Pro	Leu	Thr	Thr	Leu	Cys	Val	Ala	Ile	Ser	Ala	Val
1				5					10					15	
Leu	Leu	Thr	Ala	Cys	Gly	Gly	Ser	Ser	Gly	Gly	Phe	Asn	Pro	Pro	Ala
			20					25					30		
Ser	Thr	Pro	Ile	Pro	Asn	Ala	Gly	Asn	Ser	Gly	Asn	Ala	Gly	Asn	Ala
		35					40					45			
Gly	Asn	Ala	Gly	Gly	Thr	Gly	Gly	Ala	Asn	Ser	Gly	Ala	Gly	Asn	Ala
	50					55						60			
Gly	Gly	Thr	Gly	Gly	Ala	Asn	Ser	Gly	Ala	Gly	Ser	Ala	Ser	Thr	Pro
65					70				75						80
Glu	Pro	Lys	Tyr	Lys	Asp	Val	Pro	Thr	Asp	Glu	Asn	Lys	Lys	Ala	Glu
				85					90					95	
Val	Ser	Gly	Ile	Gln	Glu	Pro	Ala	Met	Gly	Tyr	Gly	Val	Glu	Leu	Lys
			100					105					110		
Leu	Arg	Asn	Trp	Ile	Pro	Gln	Glu	Gln	Glu	Glu	His	Ala	Lys	Ile	Asn
		115					120					125			
Thr	Asn	Asp	Val	Val	Lys	Leu	Glu	Gly	Asp	Leu	Lys	His	Asn	Pro	Phe
	130					135					140				
Asp	Asn	Ser	Ile	Trp	Gln	Asn	Ile	Lys	Asn	Ser	Lys	Glu	Val	Gln	Thr
145					150					155					160
Val	Tyr	Asn	Gln	Glu	Lys	Gln	Asn	Ile	Glu	Asp	Gln	Ile	Lys	Arg	Glu
			165						170					175	
Asn	Lys	Gln	Arg	Pro	Asp	Lys	Lys	Leu	Asp	Asp	Val	Ala	Leu	Gln	Ala
			180					185					190		
Tyr	Ile	Glu	Lys	Val	Leu	Asp	Asp	Arg	Leu	Thr	Glu	Leu	Ala	Lys	Pro
	195						200					205			
Ile	Tyr	Glu	Lys	Asn	Ile	Asn	Tyr	Ser	His	Asp	Lys	Gln	Asn	Lys	Ala
	210					215					220				
Arg	Thr	Arg	Asp	Leu	Lys	Tyr	Val	Arg	Ser	Gly	Tyr	Ile	Tyr	Arg	Ser
225					230					235					240
Gly	Tyr	Ser	Asn	Ile	Ile	Pro	Lys	Lys	Ile	Ala	Lys	Thr	Gly	Phe	Asp
			245						250					255	
Gly	Ala	Leu	Phe	Tyr	Gln	Gly	Thr	Gln	Thr	Ala	Lys	Gln	Leu	Pro	Val
			260					265					270		
Ser	Gln	Val	Lys	Tyr	Lys	Gly	Thr	Trp	Asp	Phe	Met	Thr	Asp	Ala	Lys
		275					280						285		

Lys Gly Gln Ser Phe Ser Ser Phe Gly Thr Ser Gln Arg Leu Ala Gly
 290 295 300
 Asp Arg Tyr Ser Ala Met Ser Tyr His Glu Tyr Pro Ser Leu Leu Thr
 305 310 315 320
 Asp Glu Lys Asn Lys Pro Asp Asn Tyr Asn Gly Glu Tyr Gly His Ser
 325 330 335
 Ser Glu Phe Thr Val Asp Phe Ser Lys Lys Ser Leu Lys Gly Glu Leu
 340 345 350
 Ser Ser Asn Ile Gln Asp Gly His Lys Gly Ser Val Asn Lys Thr Lys
 355 360 365
 Arg Tyr Asp Ile Asp Ala Asn Ile Tyr Gly Asn Arg Phe Arg Gly Ser
 370 375 380
 Ala Thr Ala Ser Asp Thr Thr Glu Ala Ser Lys Ser Lys His Pro Phe
 385 390 395 400
 Thr Ser Asp Ala Lys Asn Ser Leu Glu Gly Gly Phe Tyr Gly Pro Asn
 405 410 415
 Ala Glu Glu Leu Ala Gly Lys Phe Leu Thr Asn Asp Asn Lys Leu Phe
 420 425 430
 Gly Val Phe Gly Ala Lys Arg Glu Ser Glu Ala Lys Glu Lys Thr Glu
 435 440 445
 Ala Ile Leu Asp Ala Tyr Ala Leu Gly Thr Phe Asn Lys Pro Gly Thr
 450 455 460
 Thr Asn Pro Ala Phe Thr Ala Asn Ser Lys Lys Glu Leu Asp Asn Phe
 465 470 475 480
 Gly Asn Ala Lys Lys Leu Val Leu Gly Ser Thr Val Ile Asp Leu Val
 485 490 495
 Pro Thr Gly Ala Thr Lys Asp Val Asn Glu Phe Lys Glu Lys Pro Lys
 500 505 510
 Ser Ala Thr Asn Lys Ala Gly Glu Thr Leu Met Val Asn Asp Glu Val
 515 520 525
 Ile Val Lys Thr Tyr Gly Tyr Gly Arg Asn Phe Glu Tyr Leu Lys Phe
 530 535 540
 Gly Glu Leu Ser Ile Gly Gly Ser His Ser Val Phe Leu Gln Gly Glu
 545 550 555 560
 Arg Thr Ala Glu Lys Ala Val Pro Thr Glu Gly Thr Ala Lys Tyr Leu
 565 570 575
 Gly Asn Trp Val Gly Tyr Ile Thr Gly Lys Asp Thr Gly Thr Ser Thr
 580 585 590
 Gly Lys Ser Phe Asn Glu Ala Gln Asp Ile Ala Asp Phe Asp Ile Asp
 595 600 605

Phe Glu Arg Lys Ser Val Lys Gly Lys Leu Thr Thr Gln Gly Arg Gln
610 615 620

Asp Pro Val Phe Asn Ile Thr Gly Gln Ile Ala Gly Asn Gly Trp Thr
625 630 635 640

Gly Thr Ala Ser Thr Ala Lys Ala Asn Val Gly Gly Tyr Lys Ile Asp
645 650 655

Ser Ser Ser Thr Gly Lys Ser Ile Val Ile Glu Asn Ala Lys Val Thr
660 665 670

Gly Gly Phe Tyr Gly Pro Asn Ala Asn Glu Met Gly Gly Ser Phe Thr
675 680 685

His Asp Thr Asp Asp Ser Lys Ala Ser Val Val Phe Gly Thr Lys Arg
690 695 700

Gln Glu Glu Val Lys
705

<210> 16

<211> 689

<212> PRT

<213> Moraxella catarrhalis

<400> 16

Cys Gly Gly Ser Ser Gly Gly Phe Asn Pro Pro Ala Ser Thr Pro Ile
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Pro Asn Ala Gly Asn Ser Gly Asn Ala Gly Asn Ala Gly Asn Ala Gly
20 25 30

Gly Thr Gly Gly Ala Asn Ser Gly Ala Gly Asn Ala Gly Gly Thr Gly
35 40 45

Gly Ala Asn Ser Gly Ala Gly Ser Ala Ser Thr Pro Glu Pro Lys Tyr
50 55 60

Lys Asp Val Pro Thr Asp Glu Asn Lys Lys Ala Glu Val Ser Gly Ile
65 70 75 80

Gln Glu Pro Ala Met Gly Tyr Gly Val Glu Leu Lys Leu Arg Asn Trp
85 90 95

Ile Pro Gln Glu Gln Glu Glu His Ala Lys Ile Asn Thr Asn Asp Val
100 105 110

Val Lys Leu Glu Gly Asp Leu Lys His Asn Pro Phe Asp Asn Ser Ile
115 120 125

Trp Gln Asn Ile Lys Asn Ser Lys Glu Val Gln Thr Val Tyr Asn Gln
130 135 140

Glu Lys Gln Asn Ile Glu Asp Gln Ile Lys Arg Glu Asn Lys Gln Arg
145 150 155 160

Pro Asp Lys Lys Leu Asp Asp Val Ala Leu Gln Ala Tyr Ile Glu Lys
 165 170 175
 Val Leu Asp Asp Arg Leu Thr Glu Leu Ala Lys Pro Ile Tyr Glu Lys
 180 185 190
 Asn Ile Asn Tyr Ser His Asp Lys Gln Asn Lys Ala Arg Thr Arg Asp
 195 200 205
 Leu Lys Tyr Val Arg Ser Gly Tyr Ile Tyr Arg Ser Gly Tyr Ser Asn
 210 215 220
 Ile Ile Pro Lys Lys Ile Ala Lys Thr Gly Phe Asp Gly Ala Leu Phe
 225 230 235 240
 Tyr Gln Gly Thr Gln Thr Ala Lys Gln Leu Pro Val Ser Gln Val Lys
 245 250 255
 Tyr Lys Gly Thr Trp Asp Phe Met Thr Asp Ala Lys Lys Gly Gln Ser
 260 265 270
 Phe Ser Ser Phe Gly Thr Ser Gln Arg Leu Ala Gly Asp Arg Tyr Ser
 275 280 285
 Ala Met Ser Tyr His Glu Tyr Pro Ser Leu Leu Thr Asp Glu Lys Asn
 290 295 300
 Lys Pro Asp Asn Tyr Asn Gly Glu Tyr Gly His Ser Ser Glu Phe Thr
 305 310 315 320
 Val Asp Phe Ser Lys Lys Ser Leu Lys Gly Glu Leu Ser Ser Asn Ile
 325 330 335
 Gln Asp Gly His Lys Gly Ser Val Asn Lys Thr Lys Arg Tyr Asp Ile
 340 345 350
 Asp Ala Asn Ile Tyr Gly Asn Arg Phe Arg Gly Ser Ala Thr Ala Ser
 355 360 365
 Asp Thr Thr Glu Ala Ser Lys Ser Lys His Pro Phe Thr Ser Asp Ala
 370 375 380
 Lys Asn Ser Leu Glu Gly Gly Phe Tyr Gly Pro Asn Ala Glu Glu Leu
 385 390 395 400
 Ala Gly Lys Phe Leu Thr Asn Asp Asn Lys Leu Phe Gly Val Phe Gly
 405 410 415
 Ala Lys Arg Glu Ser Glu Ala Lys Glu Lys Thr Glu Ala Ile Leu Asp
 420 425 430
 Ala Tyr Ala Leu Gly Thr Phe Asn Lys Pro Gly Thr Thr Asn Pro Ala
 435 440 445
 Phe Thr Ala Asn Ser Lys Lys Glu Leu Asp Asn Phe Gly Asn Ala Lys
 450 455 460
 Lys Leu Val Leu Gly Ser Thr Val Ile Asp Leu Val Pro Thr Gly Ala
 465 470 475 480

Thr Lys Asp Val Asn Glu Phe Lys Glu Lys Pro Lys Ser Ala Thr Asn
 485 490 495
 Lys Ala Gly Glu Thr Leu Met Val Asn Asp Glu Val Ile Val Lys Thr
 500 505 510
 Tyr Gly Tyr Gly Arg Asn Phe Glu Tyr Leu Lys Phe Gly Glu Leu Ser
 515 520 525
 Ile Gly Gly Ser His Ser Val Phe Leu Gln Gly Glu Arg Thr Ala Glu
 530 535 540
 Lys Ala Val Pro Thr Glu Gly Thr Ala Lys Tyr Leu Gly Asn Trp Val
 545 550 555 560
 Gly Tyr Ile Thr Gly Lys Asp Thr Gly Thr Ser Thr Gly Lys Ser Phe
 565 570 575
 Asn Glu Ala Gln Asp Ile Ala Asp Phe Asp Ile Asp Phe Glu Arg Lys
 580 585 590
 Ser Val Lys Gly Lys Leu Thr Thr Gln Gly Arg Gln Asp Pro Val Phe
 595 600 605
 Asn Ile Thr Gly Gln Ile Ala Gly Asn Gly Trp Thr Gly Thr Ala Ser
 610 615 620
 Thr Ala Lys Ala Asn Val Gly Gly Tyr Lys Ile Asp Ser Ser Ser Thr
 625 630 635 640
 Gly Lys Ser Ile Val Ile Glu Asn Ala Lys Val Thr Gly Gly Phe Tyr
 645 650 655
 Gly Pro Asn Ala Asn Glu Met Gly Gly Ser Phe Thr His Asp Thr Asp
 660 665 670
 Asp Ser Lys Ala Ser Val Val Phe Gly Thr Lys Arg Gln Glu Glu Val
 675 680 685

Lys

<210> 17
 <211> 7
 <212> PRT
 <213> Moraxella catarrhalis

<400> 17
 Asn Glu Val Thr Gly Leu Gly
 1 5

<210> 18
 <211> 7
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 <213> Moraxella catarrhalis

<400> 18
 Gly Ala Ile Asn Glu Ile Glu
 1 5

<210> 19
 <211> 60
 <212> DNA
 <213> Moraxella catarrhalis

<400> 19
 aatcaatcaa aacaaaacaa caaatccaaa aaatccaaac aagtattaaa acttagtgcc 60

<210> 20
 <211> 57
 <212> DNA
 <213> Moraxella catarrhalis

<400> 20
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<210> 21
 <211> 912
 <212> PRT
 <213> Moraxella catarrhalis

<400> 21
 Met Thr Lys Lys Pro Tyr Phe Arg Leu Ser Ile Ile Ser Cys Leu Leu
 1 5 10 15

Ile Gly Cys Tyr Val Lys Ala Glu Thr Gln Ser Ile Lys Asp Thr Lys
 20 25 30

Glu Ala Ile Ser Ser Glu Val Asp Thr Gln Ser Thr Glu Asp Ser Glu
 35 40 45

Leu Glu Thr Ile Ser Val Thr Ala Glu Lys Ile Arg Asp Arg Lys Asp
 50 55 60

Asn Glu Val Thr Gly Leu Gly Lys Ile Ile Lys Thr Ser Glu Ser Ile
 65 70 75 80

Ser Arg Glu Gln Val Leu Asn Ile Arg Asp Leu Thr Arg Tyr Asp Pro
 85 90 95

Gly Ile Ser Val Val Glu Gln Gly Arg Gly Ala Ser Ser Gly Tyr Ser
 100 105 110

Ile Arg Gly Met Asp Arg Asn Arg Val Ala Leu Leu Val Asp Gly Leu
 115 120 125

Pro Gln Thr Gln Ser Tyr Val Val Gln Ser Pro Leu Val Ala Arg Ser
 130 135 140

Gly Tyr Ser Gly Thr Gly Ala Ile Asn Glu Ile Glu Tyr Glu Asn Val
 145 150 155 160

Lys	Ala	Val	Glu	Ile	Ser	Lys	Gly	Gly	Ser	Ser	Ser	Glu	Tyr	Gly	Asn		
				165					170					175			
Gly	Ala	Leu	Ala	Gly	Ser	Val	Thr	Phe	Gln	Ser	Lys	Ser	Ala	Ala	Asp		
			180					185					190				
Ile	Leu	Glu	Gly	Asp	Lys	Ser	Trp	Gly	Ile	Gln	Thr	Lys	Asn	Ala	Tyr		
		195					200					205					
Ser	Ser	Lys	Asn	Lys	Gly	Phe	Thr	His	Ser	Leu	Ala	Val	Ala	Gly	Lys		
	210					215					220						
Gln	Gly	Gly	Phe	Glu	Gly	Leu	Ala	Ile	Tyr	Thr	Gln	Arg	Asn	Ser	Ile		
225					230					235					240		
Glu	Thr	Gln	Val	His	Lys	Asp	Ala	Leu	Lys	Gly	Val	Gln	Ser	Tyr	Asp		
				245					250					255			
Arg	Leu	Ile	Ala	Thr	Thr	Asp	Lys	Ser	Ser	Gly	Tyr	Phe	Val	Ile	Gln		
			260					265					270				
Gly	Glu	Cys	Pro	Asn	Gly	Asp	Asp	Lys	Cys	Ala	Ala	Lys	Pro	Pro	Ala		
		275					280					285					
Thr	Leu	Ser	Thr	Gln	Ser	Glu	Thr	Val	Ser	Val	Ser	Asp	Tyr	Thr	Gly		
	290					295					300						
Ala	Asn	Arg	Ile	Lys	Pro	Asn	Pro	Met	Lys	Tyr	Glu	Ser	Gln	Ser	Trp		
305					310					315					320		
Phe	Leu	Arg	Gly	Gly	Tyr	His	Phe	Ser	Glu	Gln	His	Tyr	Ile	Gly	Gly		
				325					330					335			
Ile	Phe	Glu	Phe	Thr	Gln	Gln	Lys	Phe	Asp	Ile	Arg	Asp	Met	Thr	Phe		
			340					345					350				
Pro	Ala	Tyr	Leu	Ser	Pro	Thr	Glu	Arg	Arg	Asp	Asp	Ser	Ser	Arg	Ser		
		355					360					365					
Phe	Tyr	Pro	Met	Gln	Asp	His	Gly	Ala	Tyr	Gln	His	Ile	Glu	Asp	Gly		
	370					375					380						
Arg	Gly	Val	Lys	Tyr	Ala	Ser	Gly	Leu	Tyr	Phe	Asp	Glu	His	His	Arg		
385					390					395					400		
Lys	Gln	Arg	Val	Gly	Ile	Glu	Tyr	Ile	Tyr	Glu	Asn	Lys	Asn	Lys	Ala		
				405					410					415			
Gly	Ile	Ile	Asp	Lys	Ala	Val	Leu	Ser	Ala	Asn	Gln	Gln	Asn	Ile	Ile		
			420					425					430				
Leu	Asp	Ser	Tyr	Met	Arg	His	Thr	His	Cys	Ser	Leu	Tyr	Pro	Asn	Pro		
		435					440					445					
Ser	Lys	Asn	Cys	Arg	Pro	Thr	Leu	Asp	Lys	Pro	Tyr	Ser	Tyr	Tyr	Arg		
	450					455					460						
Ser	Asp	Arg	Asn	Val	Tyr	Lys	Glu	Lys	His	Asn	Met	Leu	Gln	Leu	Asn		
465					470					475					480		

Leu	Glu	Lys	Lys	Ile	Gln	Gln	Asn	Trp	Leu	Thr	His	Gln	Ile	Val	Phe	
				485					490					495		
Asn	Leu	Gly	Phe	Asp	Asp	Phe	Thr	Ser	Ala	Leu	Gln	His	Lys	Asp	Tyr	
			500					505					510			
Leu	Thr	Arg	Arg	Val	Ile	Ala	Thr	Ala	Asp	Ser	Ile	Pro	Arg	Lys	Pro	
		515					520					525				
Gly	Glu	Thr	Gly	Lys	Pro	Arg	Asn	Gly	Leu	Gln	Ser	Gln	Pro	Tyr	Leu	
	530					535					540					
Tyr	Pro	Lys	Pro	Glu	Pro	Tyr	Phe	Ala	Gly	Gln	Asp	His	Cys	Asn	Tyr	
545					550					555					560	
Gln	Gly	Ser	Ser	Ser	Asn	Tyr	Arg	Asp	Cys	Lys	Val	Arg	Leu	Ile	Lys	
				565					570					575		
Gly	Lys	Asn	Tyr	Tyr	Phe	Ala	Ala	Arg	Asn	Asn	Met	Ala	Leu	Gly	Lys	
			580					585					590			
Tyr	Val	Asp	Leu	Gly	Leu	Gly	Ile	Arg	Tyr	Asp	Val	Ser	Arg	Thr	Lys	
		595					600					605				
Ala	Asn	Glu	Ser	Thr	Ile	Ser	Val	Gly	Lys	Phe	Lys	Asn	Phe	Ser	Trp	
	610					615					620					
Asn	Thr	Gly	Ile	Val	Ile	Lys	Pro	Thr	Glu	Trp	Leu	Asp	Leu	Ser	Tyr	
625					630					635					640	
Arg	Leu	Ser	Thr	Gly	Phe	Arg	Asn	Pro	Ser	Phe	Ser	Glu	Met	Tyr	Gly	
				645					650					655		
Trp	Arg	Tyr	Gly	Gly	Lys	Asn	Asp	Glu	Val	Tyr	Val	Gly	Lys	Phe	Lys	
			660					665					670			
Pro	Glu	Thr	Ser	Arg	Asn	Gln	Glu	Phe	Gly	Leu	Ala	Leu	Lys	Gly	Asp	
		675					680					685				
Phe	Gly	Asn	Ile	Glu	Ile	Ser	His	Phe	Ser	Asn	Ala	Tyr	Arg	Asn	Leu	
	690					695					700					
Ile	Ala	Phe	Ala	Glu	Glu	Leu	Ser	Lys	Asn	Gly	Thr	Gly	Lys	Gly	Asn	
705					710					715					720	
Tyr	Gly	Tyr	His	Asn	Ala	Gln	Asn	Ala	Lys	Leu	Val	Gly	Val	Asn	Ile	
				725					730					735		
Thr	Ala	Gln	Leu	Asp	Phe	Asn	Gly	Leu	Trp	Lys	Arg	Ile	Pro	Tyr	Gly	
			740					745					750			
Trp	Tyr	Ala	Thr	Phe	Ala	Tyr	Asn	Gln	Val	Lys	Val	Lys	Asp	Gln	Lys	
		755					760					765				
Ile	Asn	Ala	Gly	Leu	Ala	Ser	Val	Ser	Ser	Tyr	Leu	Phe	Asp	Ala	Ile	
	770					775					780					

Gln Pro Ser Arg Tyr Ile Ile Gly Leu Gly Tyr Asp His Pro Ser Asn
 785 790 795 800
 Thr Trp Gly Ile Asn Thr Met Phe Thr Gln Ser Lys Ala Lys Ser Gln
 805 810 815
 Asn Glu Leu Leu Gly Lys Arg Ala Leu Gly Asn Asn Ser Arg Asp Val
 820 825 830
 Lys Ser Thr Arg Lys Leu Thr Arg Ala Trp His Ile Leu Asp Val Ser
 835 840 845
 Gly Tyr Tyr Met Ala Asn Lys Asn Ile Met Leu Arg Leu Gly Ile Tyr
 850 855 860
 Asn Leu Phe Asn Tyr Arg Tyr Val Thr Trp Glu Ala Val Arg Gln Thr
 865 870 875 880
 Ala Gln Gly Ala Val Asn Gln His Gln Asn Val Gly Ser Tyr Thr Arg
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 Tyr Ala Ala Ser Gly Arg Asn Tyr Thr Leu Thr Leu Glu Met Lys Phe
 900 905 910

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 Met Thr Ala Leu Pro Val Tyr Ala Glu Asn Val Gln Ala Glu Gln Ala
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 Gln Glu Lys Gln Leu Asp Thr Ile Gln Val Lys Ala Lys Lys Gln Lys
 35 40 45
 Thr Arg Arg Asp Asn Glu Val Thr Gly Leu Gly Lys Leu Val Lys Ser
 50 55 60
 Ser Asp Thr Leu Ser Lys Glu Gln Val Leu Asn Ile Arg Asp Leu Thr
 65 70 75 80
 Arg Tyr Asp Pro Gly Ile Ala Val Val Glu Gln Gly Arg Gly Ala Ser
 85 90 95
 Ser Gly Tyr Ser Ile Arg Gly Met Asp Lys Asn Arg Val Ser Leu Thr
 100 105 110
 Val Asp Gly Val Ser Gln Ile Gln Ser Tyr Thr Ala Gln Ala Ala Leu
 115 120 125

Gly	Gly	Thr	Arg	Thr	Ala	Gly	Ser	Ser	Gly	Ala	Ile	Asn	Glu	Ile	Glu	
130						135					140					
Tyr	Glu	Asn	Val	Lys	Ala	Val	Glu	Ile	Ser	Lys	Gly	Ser	Asn	Ser	Ser	
145					150					155					160	
Glu	Tyr	Gly	Asn	Gly	Ala	Leu	Ala	Gly	Ser	Val	Ala	Phe	Gln	Thr	Lys	
				165					170					175		
Thr	Ala	Ala	Asp	Ile	Ile	Gly	Glu	Gly	Lys	Gln	Trp	Gly	Ile	Gln	Ser	
			180					185					190			
Lys	Thr	Ala	Tyr	Ser	Gly	Lys	Asp	His	Ala	Leu	Thr	Gln	Ser	Leu	Ala	
		195					200					205				
Leu	Ala	Gly	Arg	Ser	Gly	Gly	Ala	Glu	Ala	Leu	Leu	Ile	Tyr	Thr	Lys	
210						215					220					
Arg	Arg	Gly	Arg	Glu	Ile	His	Ala	His	Lys	Asp	Ala	Gly	Lys	Gly	Val	
225					230					235					240	
Gln	Ser	Phe	Asn	Arg	Leu	Val	Leu	Asp	Glu	Asp	Lys	Lys	Glu	Gly	Gly	
			245						250					255		
Ser	Gln	Tyr	Arg	Tyr	Phe	Ile	Val	Glu	Glu	Glu	Cys	His	Asn	Gly	Tyr	
			260					265					270			
Ala	Ala	Cys	Lys	Asn	Lys	Leu	Lys	Glu	Asp	Ala	Ser	Val	Lys	Asp	Glu	
		275					280					285				
Arg	Lys	Thr	Val	Ser	Thr	Gln	Asp	Tyr	Thr	Gly	Ser	Asn	Arg	Leu	Leu	
290						295					300					
Ala	Asn	Pro	Leu	Glu	Tyr	Gly	Ser	Gln	Ser	Trp	Leu	Phe	Arg	Pro	Gly	
305					310					315					320	
Trp	His	Leu	Asp	Asn	Arg	His	Tyr	Val	Gly	Ala	Val	Leu	Glu	Arg	Thr	
				325					330					335		
Gln	Gln	Thr	Phe	Asp	Thr	Arg	Asp	Met	Thr	Val	Pro	Ala	Tyr	Phe	Thr	
			340					345					350			
Ser	Glu	Asp	Tyr	Val	Pro	Gly	Ser	Leu	Lys	Gly	Leu	Gly	Lys	Tyr	Ser	
		355					360					365				
Gly	Asp	Asn	Lys	Ala	Glu	Arg	Leu	Phe	Val	Gln	Gly	Glu	Gly	Ser	Thr	
370						375					380					
Leu	Gln	Gly	Ile	Gly	Tyr	Gly	Thr	Gly	Val	Phe	Tyr	Asp	Glu	Arg	His	
385					390					395					400	
Thr	Lys	Asn	Arg	Tyr	Gly	Val	Glu	Tyr	Val	Tyr	His	Asn	Ala	Asp	Lys	
				405					410					415		
Asp	Thr	Trp	Ala	Asp	Tyr	Ala	Arg	Leu	Ser	Tyr	Asp	Arg	Gln	Gly	Ile	
			420					425					430			
Asp	Leu	Asp	Asn	Arg	Leu	Gln	Gln	Thr	His	Cys	Ser	His	Asp	Gly	Ser	
		435					440						445			

Asp	Lys	Asn	Cys	Arg	Pro	Asp	Gly	Asn	Lys	Pro	Tyr	Ser	Phe	Tyr	Lys	450	455	460	
Ser	Asp	Arg	Met	Ile	Tyr	Glu	Glu	Ser	Arg	Asn	Leu	Phe	Gln	Ala	Val	465	470	475	480
Phe	Lys	Lys	Ala	Phe	Asp	Thr	Ala	Lys	Ile	Arg	His	Asn	Leu	Ser	Ile	485	490	495	
Asn	Leu	Gly	Tyr	Asp	Arg	Phe	Lys	Ser	Gln	Leu	Ser	His	Ser	Asp	Tyr	500	505	510	
Tyr	Leu	Gln	Asn	Ala	Val	Gln	Ala	Tyr	Asp	Leu	Ile	Thr	Pro	Pro	Lys	515	520	525	
Pro	Pro	Phe	Pro	Asn	Gly	Ser	Lys	Asp	Asn	Pro	Tyr	Arg	Val	Ser	Ile	530	535	540	
Gly	Lys	Thr	Thr	Val	Asn	Thr	Ser	Pro	Ile	Cys	Arg	Phe	Gly	Asn	Asn	545	550	555	560
Thr	Tyr	Thr	Asp	Cys	Thr	Pro	Arg	Asn	Ile	Gly	Gly	Asn	Gly	Tyr	Tyr	565	570	575	
Ala	Ala	Val	Gln	Asp	Asn	Val	Arg	Leu	Gly	Arg	Trp	Ala	Asp	Val	Gly	580	585	590	
Ala	Gly	Ile	Arg	Tyr	Asp	Tyr	Arg	Ser	Thr	His	Ser	Glu	Asp	Lys	Ser	595	600	605	
Val	Ser	Thr	Gly	Thr	His	Arg	Asn	Leu	Ser	Trp	Asn	Ala	Gly	Val	Val	610	615	620	
Leu	Lys	Pro	Phe	Thr	Trp	Met	Asp	Leu	Thr	Tyr	Arg	Ala	Ser	Thr	Gly	625	630	635	640
Phe	Arg	Leu	Pro	Ser	Phe	Ala	Glu	Met	Tyr	Gly	Trp	Arg	Ala	Gly	Glu	645	650	655	
Ser	Leu	Lys	Thr	Leu	Asp	Leu	Lys	Pro	Glu	Lys	Ser	Phe	Asn	Arg	Glu	660	665	670	
Ala	Gly	Ile	Val	Phe	Lys	Gly	Asp	Phe	Gly	Asn	Leu	Glu	Ala	Ser	Tyr	675	680	685	
Phe	Asn	Asn	Ala	Tyr	Arg	Asp	Leu	Ile	Ala	Phe	Gly	Tyr	Glu	Thr	Arg	690	695	700	
Thr	Gln	Asn	Gly	Gln	Thr	Ser	Ala	Ser	Gly	Asp	Pro	Gly	Tyr	Arg	Asn	705	710	715	720
Ala	Gln	Asn	Ala	Arg	Ile	Ala	Gly	Ile	Asn	Ile	Leu	Gly	Lys	Ile	Asp	725	730	735	
Trp	His	Gly	Val	Trp	Gly	Gly	Leu	Pro	Asp	Gly	Leu	Tyr	Ser	Thr	Leu	740	745	750	

Ala Tyr Asn Arg Ile Lys Val Lys Asp Ala Asp Ile Arg Ala Asp Arg
755 760 765

Thr Phe Val Thr Ser Tyr Leu Phe Asp Ala Val Gln Pro Ser Arg Tyr
770 775 780

Val Leu Gly Leu Gly Tyr Asp His Pro Asp Gly Ile Trp Gly Ile Asn
785 790 795 800

Thr Met Phe Thr Tyr Ser Lys Ala Lys Ser Val Asp Glu Leu Leu Gly
805 810 815

Ser Gln Ala Leu Leu Asn Gly Asn Ala Asn Ala Lys Lys Ala Ala Ser
820 825 830

Arg Arg Thr Arg Pro Trp Tyr Val Thr Asp Val Ser Gly Tyr Tyr Asn
835 840 845

Ile Lys Lys His Leu Thr Leu Arg Ala Gly Val Tyr Asn Leu Leu Asn
850 855 860

Tyr Arg Tyr Val Thr Trp Glu Asn Val Arg Gln Thr Ala Gly Gly Ala
865 870 875 880

Val Asn Gln His Lys Asn Val Gly Val Tyr Asn Arg Tyr Ala Ala Pro
885 890 895

Gly Arg Asn Tyr Thr Phe Ser Leu Glu Met Lys Phe
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Met Thr Ala Leu Pro Ala Tyr Ala Glu Asn Val Gln Ala Gly Gln Ala
20 25 30

Gln Glu Lys Gln Leu Asp Thr Ile Gln Val Lys Ala Lys Lys Gln Lys
35 40 45

Thr Arg Arg Asp Asn Glu Val Thr Gly Leu Gly Lys Leu Val Lys Thr
50 55 60

Ala Asp Thr Leu Ser Lys Glu Gln Val Leu Asp Ile Arg Asp Leu Thr
65 70 75 80

Arg Tyr Asp Pro Gly Ile Ala Val Val Glu Gln Gly Arg Gly Ala Ser
85 90 95

Ser Gly Tyr Ser Ile Arg Gly Met Asp Lys Asn Arg Val Ser Leu Thr
100 105 110

Val	Asp	Gly	Leu	Ala	Gln	Ile	Gln	Ser	Tyr	Thr	Ala	Gln	Ala	Ala	Leu	115	120	125
Gly	Gly	Thr	Arg	Thr	Ala	Gly	Ser	Ser	Gly	Ala	Ile	Asn	Glu	Ile	Glu	130	135	140
Tyr	Glu	Asn	Val	Lys	Ala	Val	Glu	Ile	Ser	Lys	Gly	Ser	Asn	Ser	Val	145	150	155
Glu	Gln	Gly	Ser	Gly	Ala	Leu	Ala	Gly	Ser	Val	Ala	Phe	Gln	Thr	Lys	165	170	175
Thr	Ala	Asp	Asp	Val	Ile	Gly	Glu	Gly	Arg	Gln	Trp	Gly	Ile	Gln	Ser	180	185	190
Lys	Thr	Ala	Tyr	Ser	Gly	Lys	Asn	Arg	Gly	Leu	Thr	Gln	Ser	Ile	Ala	195	200	205
Leu	Ala	Gly	Arg	Ile	Gly	Gly	Ala	Glu	Ala	Leu	Leu	Ile	His	Thr	Gly	210	215	220
Arg	Arg	Ala	Gly	Glu	Ile	Arg	Ala	His	Glu	Asp	Ala	Gly	Arg	Gly	Val	225	230	235
Gln	Ser	Phe	Asn	Arg	Leu	Val	Pro	Val	Glu	Asp	Ser	Ser	Glu	Tyr	Ala	245	250	255
Tyr	Phe	Ile	Val	Glu	Asp	Glu	Cys	Glu	Gly	Lys	Asn	Tyr	Glu	Thr	Cys	260	265	270
Lys	Ser	Lys	Pro	Lys	Lys	Asp	Val	Val	Gly	Lys	Asp	Glu	Arg	Gln	Thr	275	280	285
Val	Ser	Thr	Arg	Asp	Tyr	Thr	Gly	Pro	Asn	Arg	Phe	Leu	Ala	Asp	Pro	290	295	300
Leu	Ser	Tyr	Glu	Ser	Arg	Ser	Trp	Leu	Phe	Arg	Pro	Gly	Phe	Arg	Phe	305	310	315
Glu	Asn	Lys	Arg	His	Tyr	Ile	Gly	Gly	Ile	Leu	Glu	His	Thr	Gln	Gln	325	330	335
Thr	Phe	Asp	Thr	Arg	Asp	Met	Thr	Val	Pro	Ala	Phe	Leu	Thr	Lys	Ala	340	345	350
Val	Phe	Asp	Ala	Asn	Ser	Lys	Gln	Ala	Gly	Ser	Leu	Pro	Gly	Asn	Gly	355	360	365
Lys	Tyr	Ala	Gly	Asn	His	Lys	Tyr	Gly	Gly	Leu	Phe	Thr	Asn	Gly	Glu	370	375	380
Asn	Gly	Ala	Leu	Val	Gly	Ala	Glu	Tyr	Gly	Thr	Gly	Val	Phe	Tyr	Asp	385	390	395
Glu	Thr	His	Thr	Lys	Ser	Arg	Tyr	Gly	Leu	Glu	Tyr	Val	Tyr	Thr	Asn	405	410	415
Ala	Asp	Lys	Asp	Thr	Trp	Ala	Asp	Tyr	Ala	Arg	Leu	Ser	Tyr	Asp	Arg	420	425	430

Gln Gly Ile Gly Leu Asp Asn His Phe Gln Gln Thr His Cys Ser Ala
 435 440 445
 Asp Gly Ser Asp Lys Tyr Cys Arg Pro Ser Ala Asp Lys Pro Phe Ser
 450 455 460
 Tyr Tyr Lys Ser Asp Arg Val Ile Tyr Gly Glu Ser His Arg Leu Leu
 465 470 475 480
 Gln Ala Ala Phe Lys Lys Ser Phe Asp Thr Ala Lys Ile Arg His Asn
 485 490 495
 Leu Ser Val Asn Leu Gly Phe Asp Arg Phe Asp Ser Asn Leu Arg His
 500 505 510
 Gln Asp Tyr Tyr Tyr Gln His Ala Asn Arg Ala Tyr Ser Ser Lys Thr
 515 520 525
 Pro Pro Lys Thr Ala Asn Pro Asn Gly Asp Lys Ser Lys Pro Tyr Trp
 530 535 540
 Val Ser Ile Gly Gly Gly Asn Val Val Thr Gly Gln Ile Cys Leu Phe
 545 550 555 560
 Gly Asn Asn Thr Tyr Thr Asp Cys Thr Pro Arg Ser Ile Asn Gly Lys
 565 570 575
 Ser Tyr Tyr Ala Ala Val Arg Asp Asn Val Arg Leu Gly Arg Trp Ala
 580 585 590
 Asp Val Gly Ala Gly Leu Arg Tyr Asp Tyr Arg Ser Thr His Ser Asp
 595 600 605
 Asp Gly Ser Val Ser Thr Gly Thr His Arg Thr Leu Ser Trp Asn Ala
 610 615 620
 Gly Ile Val Leu Lys Pro Ala Asp Trp Leu Asp Leu Thr Tyr Arg Thr
 625 630 635 640
 Ser Thr Gly Phe Arg Leu Pro Ser Phe Ala Glu Met Tyr Gly Trp Arg
 645 650 655
 Ser Gly Val Gln Ser Lys Ala Val Lys Ile Asp Pro Glu Lys Ser Phe
 660 665 670
 Asn Lys Glu Ala Gly Ile Val Phe Lys Gly Asp Phe Gly Asn Leu Glu
 675 680 685
 Ala Ser Trp Phe Asn Asn Ala Tyr Arg Asp Leu Ile Val Arg Gly Tyr
 690 695 700
 Glu Ala Gln Ile Lys Asn Gly Lys Glu Glu Ala Lys Gly Asp Pro Ala
 705 710 715 720
 Tyr Leu Asn Ala Gln Ser Ala Arg Ile Thr Gly Ile Asn Ile Leu Gly
 725 730 735

Lys Ile Asp Trp Asn Gly Val Trp Asp Lys Leu Pro Glu Gly Trp Tyr
 740 745 750
 Ser Thr Phe Ala Tyr Asn Arg Val His Val Arg Asp Ile Lys Lys Arg
 755 760 765
 Ala Asp Arg Thr Asp Ile Gln Ser His Leu Phe Asp Ala Ile Gln Pro
 770 775 780
 Ser Arg Tyr Val Val Gly Leu Gly Tyr Asp Gln Pro Glu Gly Lys Trp
 785 790 795 800
 Gly Val Asn Gly Met Leu Thr Tyr Ser Lys Ala Lys Glu Ile Thr Glu
 805 810 815
 Leu Leu Gly Ser Arg Ala Leu Leu Asn Gly Asn Ser Arg Asn Thr Lys
 820 825 830
 Ala Thr Ala Arg Arg Thr Arg Pro Trp Tyr Ile Val Asp Val Ser Gly
 835 840 845
 Tyr Tyr Thr Ile Lys Lys His Phe Thr Leu Arg Ala Gly Val Tyr Asn
 850 855 860
 Leu Leu Asn Tyr Arg Tyr Val Thr Trp Glu Asn Val Arg Gln Thr Ala
 865 870 875 880
 Gly Gly Ala Val Asn Gln His Lys Asn Val Gly Val Tyr Asn Arg Tyr
 885 890 895
 Ala Ala Pro Gly Arg Asn Tyr Thr Phe Ser Leu Glu Met Lys Phe
 900 905 910

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 Met Thr Ala Leu Pro Ala Tyr Ala Glu Asn Val Gln Ala Gly Gln Ala
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 Gln Glu Lys Gln Leu Asp Thr Ile Gln Val Lys Ala Lys Lys Gln Lys
 35 40 45
 Thr Arg Arg Asp Asn Glu Val Thr Gly Leu Gly Lys Leu Val Lys Thr
 50 55 60
 Ala Asp Thr Leu Ser Lys Glu Gln Val Leu Asp Ile Arg Asp Leu Thr
 65 70 75 80
 Arg Tyr Asp Pro Gly Ile Ala Val Val Glu Gln Gly Arg Gly Ala Ser
 85 90 95

Ser	Gly	Tyr	Ser	Ile	Arg	Gly	Met	Asp	Lys	Asn	Arg	Val	Ser	Leu	Thr	100	105	110
Val	Asp	Gly	Leu	Ala	Gln	Ile	Gln	Ser	Tyr	Thr	Ala	Gln	Ala	Ala	Leu	115	120	125
Gly	Gly	Thr	Arg	Thr	Ala	Gly	Ser	Ser	Gly	Ala	Ile	Asn	Glu	Ile	Glu	130	135	140
Tyr	Glu	Asn	Val	Lys	Ala	Val	Glu	Ile	Ser	Lys	Gly	Ser	Asn	Ser	Val	145	150	155
Glu	Gln	Gly	Ser	Gly	Ala	Leu	Ala	Gly	Ser	Val	Ala	Phe	Gln	Thr	Lys	165	170	175
Thr	Ala	Asp	Asp	Val	Ile	Gly	Glu	Gly	Arg	Gln	Trp	Gly	Ile	Gln	Ser	180	185	190
Lys	Thr	Ala	Tyr	Ser	Gly	Lys	Asn	Arg	Gly	Leu	Thr	Gln	Ser	Leu	Ala	195	200	205
Leu	Ala	Gly	Arg	Ile	Gly	Gly	Ala	Glu	Ala	Leu	Leu	Ile	Arg	Thr	Gly	210	215	220
Arg	His	Ala	Gly	Glu	Ile	Arg	Ala	His	Glu	Ala	Ala	Gly	Arg	Gly	Val	225	230	235
Gln	Ser	Phe	Asn	Arg	Leu	Ala	Pro	Val	Asp	Asp	Gly	Ser	Lys	Tyr	Ala	245	250	255
Tyr	Phe	Ile	Val	Glu	Glu	Glu	Cys	Lys	Asn	Gly	Gly	His	Glu	Lys	Cys	260	265	270
Lys	Ala	Asn	Pro	Pro	Lys	Asp	Val	Val	Gly	Glu	Asp	Lys	Arg	Gln	Thr	275	280	285
Val	Ser	Thr	Arg	Asp	Tyr	Thr	Gly	Pro	Asn	Arg	Phe	Leu	Ala	Asp	Pro	290	295	300
Leu	Ser	Tyr	Glu	Ser	Arg	Ser	Trp	Leu	Phe	Arg	Pro	Gly	Phe	Arg	Phe	305	310	315
Glu	Asn	Lys	Arg	His	Tyr	Ile	Gly	Gly	Ile	Leu	Glu	Arg	Thr	Gln	Gln	325	330	335
Thr	Phe	Asp	Thr	Arg	Asp	Met	Thr	Val	Pro	Ala	Phe	Leu	Thr	Lys	Ala	340	345	350
Val	Phe	Asp	Ala	Asn	Gln	Lys	Gln	Ala	Gly	Ser	Leu	Arg	Gly	Asn	Gly	355	360	365
Lys	Tyr	Ala	Gly	Asn	His	Lys	Tyr	Gly	Gly	Leu	Phe	Thr	Ser	Gly	Glu	370	375	380
Asn	Asn	Ala	Pro	Val	Gly	Ala	Glu	Tyr	Gly	Thr	Gly	Val	Phe	Tyr	Asp	385	390	395
Glu	Thr	His	Thr	Lys	Ser	Arg	Tyr	Gly	Leu	Glu	Tyr	Val	Tyr	Thr	Asn	405	410	415

Ala Asp Lys Asp Thr Trp Ala Asp Tyr Ala Arg Leu Ser Tyr Asp Arg
 420 425 430
 Gln Gly Ile Gly Leu Asp Asn His Phe Gln Gln Thr His Cys Ser Ala
 435 440 445
 Asp Gly Ser Asp Lys Tyr Cys Arg Pro Ser Ala Asp Lys Pro Phe Ser
 450 455 460
 Tyr Tyr Lys Ser Asp Arg Val Ile Tyr Gly Glu Ser His Lys Leu Leu
 465 470 475 480
 Gln Ala Ala Phe Lys Lys Ser Phe Asp Thr Ala Lys Ile Arg His Asn
 485 490 495
 Leu Ser Val Asn Leu Gly Tyr Asp Arg Phe Gly Ser Asn Leu Arg His
 500 505 510
 Gln Asp Tyr Tyr Tyr Gln Ser Ala Asn Arg Ala Tyr Ser Ser Lys Thr
 515 520 525
 Pro Pro Gln Asn Asn Gly Lys Lys Thr Ser Pro Asn Gly Arg Glu Lys
 530 535 540
 Asn Pro Tyr Trp Val Ser Ile Gly Arg Gly Asn Val Val Thr Arg Gln
 545 550 555 560
 Ile Cys Leu Phe Gly Asn Asn Thr Tyr Thr Asp Cys Thr Pro Arg Ser
 565 570 575
 Ile Asn Gly Lys Ser Tyr Tyr Ala Ala Val Arg Asp Asn Val Arg Leu
 580 585 590
 Gly Arg Trp Ala Asp Val Gly Ala Gly Leu Arg Tyr Asp Tyr Arg Ser
 595 600 605
 Thr His Ser Asp Asp Gly Ser Val Ser Thr Gly Thr His Arg Thr Leu
 610 615 620
 Ser Trp Asn Ala Gly Ile Val Leu Lys Pro Ala Asp Trp Leu Asp Leu
 625 630 635 640
 Thr Tyr Arg Thr Ser Thr Gly Phe Arg Leu Pro Ser Phe Ala Glu Met
 645 650 655
 Tyr Gly Trp Arg Ser Gly Asp Lys Ile Lys Ala Val Lys Ile Asp Pro
 660 665 670
 Glu Lys Ser Phe Asn Lys Glu Ala Gly Ile Val Phe Lys Gly Asp Phe
 675 680 685
 Gly Asn Leu Glu Ala Ser Trp Phe Asn Asn Ala Tyr Arg Asp Leu Ile
 690 695 700
 Val Arg Gly Tyr Glu Ala Gln Ile Lys Asp Gly Lys Glu Gln Val Lys
 705 710 715 720
 Gly Asn Pro Ala Tyr Leu Asn Ala Gln Ser Ala Arg Ile Thr Gly Ile

725					730					735					
Asn	Ile	Leu	Gly	Lys	Ile	Asp	Trp	Asn	Gly	Val	Trp	Asp	Lys	Leu	Pro
			740					745					750		
Glu	Gly	Trp	Tyr	Ser	Thr	Phe	Ala	Tyr	Asn	Arg	Val	Arg	Val	Arg	Asp
			755				760					765			
Ile	Lys	Lys	Arg	Ala	Asp	Arg	Thr	Asp	Ile	Gln	Ser	His	Leu	Phe	Asp
			770				775					780			
Ala	Ile	Gln	Pro	Ser	Arg	Tyr	Val	Val	Gly	Ser	Gly	Tyr	Asp	Gln	Pro
			785				790					795			800
Glu	Gly	Lys	Trp	Gly	Val	Asn	Gly	Met	Leu	Thr	Tyr	Ser	Lys	Ala	Lys
				805					810					815	
Glu	Ile	Thr	Glu	Leu	Leu	Gly	Ser	Arg	Ala	Leu	Leu	Asn	Gly	Asn	Ser
			820					825					830		
Arg	Asn	Thr	Lys	Ala	Thr	Ser	Arg	Arg	Thr	Arg	Pro	Trp	Tyr	Ile	Val
			835				840					845			
Asp	Val	Ser	Gly	Tyr	Tyr	Thr	Val	Lys	Lys	His	Phe	Thr	Leu	Arg	Ala
			850				855					860			
Gly	Val	Tyr	Asn	Leu	Leu	Asn	His	Arg	Tyr	Val	Thr	Trp	Glu	Asn	Val
				865			870					875			880
Arg	Gln	Thr	Ala	Ala	Gly	Ala	Val	Asn	Gln	His	Lys	Asn	Val	Gly	Val
				885				890						895	
Tyr	Asn	Arg	Tyr	Ala	Ala	Pro	Gly	Arg	Asn	Tyr	Thr	Phe	Ser	Leu	Glu
			900					905					910		
Met	Lys	Phe													
			915												

<210> 25
 <211> 657
 <212> PRT
 <213> Moraxella catarrhalis

<400> 25															
Met	Lys	Ser	Val	Pro	Leu	Ile	Ser	Gly	Gly	Leu	Ser	Phe	Leu	Leu	Ser
1				5					10					15	
Ala	Cys	Ser	Gly	Gly	Gly	Ser	Phe	Asp	Val	Asp	Asn	Val	Ser	Asn	Thr
			20					25					30		
Pro	Ser	Ser	Lys	Pro	Arg	Tyr	Gln	Asp	Asp	Thr	Ser	Asn	Gln	Arg	Lys
			35				40						45		
Lys	Ser	Asn	Leu	Lys	Lys	Leu	Phe	Ile	Ser	Leu	Gly	Tyr	Gly	Met	Lys
			50			55					60				
Leu	Val	Ala	Gln	Asn	Leu	Arg	Gly	Asn	Lys	Glu	Pro	Ser	Phe	Leu	Asn
65					70					75					80

Ser Ser Phe Gly Glu Ala Asp Tyr Leu Leu Ile Asp Lys Tyr Pro Ile
 385 390 395 400
 Pro Leu Leu Pro Asp Lys Asn Thr Asn Asp Phe Ile Ser Ser Lys His
 405 410 415
 His Thr Val Gly Asn Lys Arg Tyr Lys Val Glu Ala Cys Cys Ser Asn
 420 425 430
 Leu Tyr Val Lys Phe Gly Met Tyr Tyr Glu Asp Pro Leu Lys Glu Lys
 435 440 445
 Glu Thr Glu Thr Glu Thr Glu Thr Glu Lys Asp Lys Glu Lys Glu Lys
 450 455 460
 Glu Lys Asp Lys Asp Lys Glu Lys Gln Thr Ala Ala Thr Thr Asn Thr
 465 470 475 480
 Tyr Tyr Gln Phe Leu Leu Gly His Arg Thr Pro Lys Asp Asp Ile Pro
 485 490 495
 Lys Thr Gly Ser Ala Lys Tyr His Gly Ser Trp Phe Gly Tyr Ile Thr
 500 505 510
 Asp Gly Lys Thr Ser Tyr Ser Pro Ser Gly Asp Lys Lys Arg Asp Lys
 515 520 525
 Asn Ala Val Ala Glu Phe Asn Val Asp Phe Ala Glu Lys Lys Leu Thr
 530 535 540
 Gly Glu Leu Lys Arg His Asp Thr Gly Asn Pro Val Phe Ser Ile Glu
 545 550 555 560
 Ala Asn Phe Asn Asn Ser Ser Asn Ala Phe Thr Gly Thr Ala Thr Ala
 565 570 575
 Thr Asn Phe Val Ile Asp Gly Lys Asn Ser Gln Asn Lys Asn Thr Pro
 580 585 590
 Ile Asn Ile Thr Thr Lys Val Asn Gly Ala Phe Tyr Gly Pro Lys Ala
 595 600 605
 Ser Glu Leu Gly Gly Tyr Phe Thr Tyr Asn Gly Asn Ser Thr Ala Thr
 610 615 620
 Asn Ser Glu Ser Ser Ser Thr Val Ser Ser Ser Ser Asn Ser Lys Asn
 625 630 635 640
 Ala Arg Ala Ala Val Val Phe Gly Ala Arg Gln Gln Val Glu Thr Thr
 645 650 655

Lys

<210> 26
 <211> 601
 <212> PRT
 <213> Moraxella catarrhalis

Met 1	Asn	Asn	Pro	Leu 5	Val	Asn	Gln	Ala	Ala 10	Met	Val	Leu	Pro	Val	Phe
Leu	Leu	Ser	Ala 20	Cys	Leu	Gly	Gly	Gly 25	Gly	Ser	Phe	Asp	Leu 30	Asp	Ser
Val	Glu	Thr 35	Val	Gln	Asp	Met	His 40	Ser	Lys	Pro	Lys	Tyr 45	Glu	Asp	Glu
Lys	Ser 50	Gln	Pro	Glu	Ser	Gln 55	Gln	Asp	Val	Ser	Glu 60	Asn	Ser	Gly	Ala
Ala 65	Tyr	Gly	Phe	Ala	Val 70	Lys	Leu	Pro	Arg	Arg 75	Asn	Ala	His	Phe	Asn 80
Pro	Lys	Tyr	Lys	Glu 85	Lys	His	Lys	Pro	Leu 90	Gly	Ser	Met	Asp	Trp 95	Lys
Lys	Leu	Gln	Arg 100	Gly	Glu	Pro	Asn	Ser 105	Phe	Ser	Glu	Arg	Asp 110	Glu	Leu
Glu	Lys	Lys 115	Arg	Gly	Ser	Ser	Glu 120	Leu	Ile	Glu	Ser	Lys 125	Trp	Glu	Asp
Gly 130	Gln	Ser	Arg	Val	Val	Gly 135	Tyr	Thr	Asn	Phe	Thr 140	Tyr	Val	Arg	Ser
Gly 145	Tyr	Val	Tyr	Leu	Asn 150	Lys	Asn	Asn	Ile	Asp 155	Ile	Lys	Asn	Asn	Ile 160
Val	Leu	Phe	Gly	Pro 165	Asp	Gly	Tyr	Leu	Tyr 170	Tyr	Lys	Gly	Lys	Glu 175	Pro
Ser	Lys	Glu	Leu 180	Pro	Ser	Glu	Lys	Ile 185	Thr	Tyr	Lys	Gly	Thr 190	Trp	Asp
Tyr	Val	Thr 195	Asp	Ala	Met	Glu	Lys 200	Gln	Arg	Phe	Glu	Gly 205	Leu	Gly	Ser
Ala 210	Ala	Gly	Gly	Asp	Lys	Ser 215	Gly	Ala	Leu	Ser	Ala 220	Leu	Glu	Glu	Gly
Val 225	Leu	Arg	Asn	Gln 230	Ala	Glu	Ala	Ser	Ser	Gly 235	His	Thr	Asp	Phe	Gly 240
Met	Thr	Ser	Glu	Phe 245	Glu	Val	Asp	Phe	Ser 250	Asp	Lys	Thr	Ile	Lys 255	Gly
Thr	Leu	Tyr	Arg 260	Asn	Asn	Arg	Ile	Thr 265	Gln	Asn	Asn	Ser	Glu 270	Asn	Lys
Gln	Ile	Lys 275	Thr	Thr	Arg	Tyr	Thr 280	Ile	Gln	Ala	Thr	Leu 285	His	Gly	Asn
Arg	Phe 290	Lys	Gly	Lys	Ala	Leu 295	Ala	Ala	Asp	Lys	Gly 300	Ala	Thr	Asn	Gly

Ser His Pro Phe Ile Ser Asp Ser Asp Ser Leu Glu Gly Gly Phe Tyr
 305 310 315 320
 Gly Pro Lys Gly Glu Glu Leu Ala Gly Lys Phe Leu Ser Asn Asp Asn
 325 330 335
 Lys Val Ala Ala Val Phe Gly Ala Lys Gln Lys Asp Lys Lys Asp Gly
 340 345 350
 Glu Asn Ala Ala Gly Pro Ala Thr Glu Thr Val Ile Asp Ala Tyr Arg
 355 360 365
 Ile Thr Gly Glu Glu Phe Lys Lys Glu Gln Ile Asp Ser Phe Gly Asp
 370 375 380
 Val Lys Lys Leu Leu Val Asp Gly Val Glu Leu Ser Leu Leu Pro Ser
 385 390 395 400
 Glu Gly Asn Lys Ala Ala Phe Gln His Glu Ile Glu Gln Asn Gly Val
 405 410 415
 Lys Ala Thr Val Cys Cys Ser Asn Leu Asp Tyr Met Ser Phe Gly Lys
 420 425 430
 Leu Ser Lys Glu Asn Lys Asp Asp Met Phe Leu Gln Gly Val Arg Thr
 435 440 445
 Pro Val Ser Asp Val Ala Ala Arg Thr Glu Ala Asn Ala Lys Tyr Arg
 450 455 460
 Gly Thr Trp Tyr Gly Tyr Ile Ala Asn Gly Thr Ser Trp Ser Gly Glu
 465 470 475 480
 Ala Ser Asn Gln Phe Thr Glu Gly Gly Asn Arg Ala Glu Phe Asp Val
 485 490 495
 Asp Phe Ser Thr Lys Lys Ile Ser Gly Thr Leu Thr Ala Lys Asp Arg
 500 505 510
 Thr Ser Pro Ala Phe Thr Ile Thr Ala Met Ile Lys Asp Asn Gly Phe
 515 520 525
 Ser Gly Val Ala Lys Thr Gly Glu Asn Gly Phe Ala Leu Asp Pro Gln
 530 535 540
 Asn Thr Gly Asn Ser His Tyr Thr His Ile Glu Ala Thr Val Ser Gly
 545 550 555 560
 Gly Phe Tyr Gly Lys Asn Ala Ile Glu Met Gly Gly Ser Phe Ser Phe
 565 570 575
 Pro Gly Asn Ala Pro Glu Gly Lys Gln Glu Lys Ala Ser Val Val Phe
 580 585 590
 Gly Ala Lys Arg Gln Gln Leu Val Gln
 595 600

<212> PRT

<400> 27

Met 1	Asn	Asn	Pro	Leu 5	Val	Asn	Gln	Ala	Ala 10	Met	Val	Leu	Pro	Val 15	Phe
Leu	Leu	Ser	Ala 20	Cys	Leu	Gly	Gly	Gly	Gly	Ser	Phe	Asp	Leu 30	Asp	Ser
Val	Asp	Thr 35	Glu	Ala	Pro	Arg	Pro 40	Ala	Pro	Lys	Tyr	Gln 45	Asp	Val	Ser
Ser	Glu 50	Lys	Pro	Gln	Ala	Gln	Gln 55	Asp	Gln	Gly	Gly	Tyr	Gly	Phe	Ala
Met 65	Arg	Leu	Lys	Arg	Arg 70	Asn	Trp	Tyr	Pro	Gly 75	Ala	Glu	Glu	Ser	Glu 80
Val	Lys	Leu	Asn 85	Glu	Ser	Asp	Trp	Glu	Ala 90	Thr	Gly	Leu	Pro	Thr 95	Lys
Pro	Lys	Glu	Leu 100	Pro	Lys	Arg	Gln	Lys	Ser 105	Val	Ile	Glu	Lys	Val	Glu
Thr	Asp	Gly 115	Asp	Ser	Asp	Ile	Tyr	Ser	Ser	Pro	Tyr	Leu	Thr	Pro	Ser
Asn 130	His	Gln	Asn	Gly	Ser	Ala 135	Gly	Asn	Gly	Val	Asn 140	Gln	Pro	Lys	Asn
Gln 145	Ala	Thr	Gly	His	Glu	Asn 150	Phe	Gln	Tyr	Val 155	Tyr	Ser	Gly	Trp	Phe 160
Tyr	His	Ala	Ala	Ser 165	Glu	Lys	Asp	Phe	Ser	Asn 170	Lys	Lys	Ile	Trp	Lys 175
Ser	Gly	Asp	Asp 180	Gly	Tyr	Ile	Phe	Tyr	His	Gly	Glu	Lys	Pro 190	Ser	Arg
Gln	Leu	Pro 195	Ala	Ser	Gly	Lys	Val 200	Ile	Tyr	Lys	Gly	Val 205	Trp	His	Phe
Val 210	Thr	Asp	Thr	Lys	Lys	Gly 215	Gln	Asp	Phe	Arg	Glu	Ile	Ile	Gln	Pro
Ser 225	Lys	Lys	Gln	Gly	Asp 230	Arg	Tyr	Ser	Gly	Phe 235	Ser	Gly	Asp	Gly	Ser 240
Glu	Glu	Tyr	Ser	Asn 245	Lys	Asn	Glu	Ser	Thr	Leu	Lys	Asp	Asp	His	Glu
Gly	Tyr	Gly	Phe 260	Thr	Ser	Asn	Leu	Glu	Val	Asp	Phe	Gly	Asn 270	Lys	Lys
Leu	Thr	Gly 275	Lys	Leu	Ile	Arg	Asn 280	Asn	Ala	Ser	Leu	Asn 285	Asn	Asn	Thr

Asn	Asn	Asp	Lys	His	Thr	Thr	Gln	Tyr	Tyr	Ser	Leu	Asp	Ala	Gln	Ile
290						295					300				
Thr	Gly	Gly	Asn	Pro	Phe	Asn	Gly	Thr	Ala	Thr	Ala	Thr	Asp	Lys	Lys
305					310					315					320
Glu	Asn	Glu	Thr	Lys	Leu	His	Pro	Phe	Val	Ser	Asp	Ser	Ser	Ser	Leu
				325					330					335	
Glu	Gly	Gly	Phe	Phe	Gly	Pro	Gln	Gly	Glu	Glu	Leu	Gly	Phe	Arg	Phe
			340					345					350		
Leu	Thr	Asp	Asp	Gln	Lys	Val	Ala	Val	Val	Gly	Ser	Ala	Lys	Thr	Lys
		355					360					365			
Asp	Lys	Leu	Glu	Asn	Gly	Ala	Ala	Ala	Ser	Gly	Ser	Gly	Ala	Ala	Ala
370						375					380				
Ser	Gly	Gly	Ala	Ala	Gly	Thr	Ser	Ser	Glu	Asn	Ser	Lys	Leu	Thr	Thr
385					390					395					400
Val	Leu	Asp	Ala	Val	Glu	Leu	Thr	Leu	Asn	Asp	Lys	Lys	Ile	Lys	Asn
				405					410					415	
Leu	Asp	Asn	Phe	Ser	Asn	Ala	Ala	Gln	Leu	Val	Val	Asp	Gly	Ile	Met
			420					425					430		
Ile	Pro	Leu	Leu	Pro	Lys	Asp	Ser	Glu	Ser	Gly	Asn	Thr	Gln	Ala	Asp
		435					440					445			
Lys	Gly	Lys	Asn	Gly	Gly	Thr	Glu	Phe	Thr	Arg	Lys	Phe	Glu	His	Thr
450						455					460				
Pro	Glu	Ser	Asp	Lys	Lys	Asp	Ala	Gln	Ala	Gly	Thr	Gln	Thr	Asn	Gly
465					470					475					480
Ala	Gln	Thr	Ala	Ser	Asn	Thr	Ala	Gly	Asp	Thr	Asn	Gly	Lys	Thr	Lys
				485					490					495	
Thr	Tyr	Glu	Val	Glu	Val	Cys	Cys	Ser	Asn	Leu	Asn	Tyr	Leu	Lys	Tyr
			500					505					510		
Gly	Met	Leu	Thr	Arg	Lys	Asn	Ser	Lys	Ser	Ala	Met	Gln	Ala	Gly	Gly
		515					520					525			
Asn	Ser	Ser	Gln	Ala	Asp	Ala	Lys	Thr	Glu	Gln	Val	Glu	Gln	Ser	Met
530						535					540				
Phe	Leu	Gln	Gly	Glu	Arg	Thr	Asp	Glu	Lys	Glu	Ile	Pro	Thr	Asp	Gln
545					550					555					560
Asn	Val	Val	Tyr	Arg	Gly	Ser	Trp	Tyr	Gly	His	Ile	Ala	Asn	Gly	Thr
				565					570					575	
Ser	Trp	Ser	Gly	Asn	Ala	Ser	Asp	Lys	Glu	Gly	Gly	Asn	Arg	Ala	Asp
			580					585					590		
Phe	Thr	Ile	Asn	Phe	Ala	Asp	Lys	Lys	Ile	Thr	Gly	Lys	Leu	Thr	Ala
			595				600					605			

Glu Asn Arg Thr Ala Gln Thr Phe Thr Ile Glu Gly Met Ile Gln Gly
 610 615 620
 Asn Gly Phe Glu Gly Thr Ala Lys Thr Ala Glu Ser Gly Phe Asp Leu
 625 630 635 640
 Asp Gln Lys Asn Thr Thr Arg Thr Pro Lys Ala Tyr Ile Thr Asp Ala
 645 650 655
 Lys Val Lys Gly Gly Phe Tyr Gly Pro Lys Ala Glu Glu Leu Gly Gly
 660 665 670
 Trp Phe Ala Tyr Pro Gly Asp Lys Gln Thr Glu Lys Ala Thr Ala Thr
 675 680 685
 Ser Ser Asp Gly Asn Ser Ala Ser Ser Ala Thr Val Val Phe Gly Ala
 690 695 700
 Lys Arg Gln Gln Pro Val Gln
 705 710

 <210> 28
 <211> 708
 <212> PRT
 <213> Moraxella catarrhalis

 <400> 28
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 Leu Leu Ser Ala Cys Leu Gly Gly Gly Gly Ser Phe Asp Leu Asp Ser
 20 25 30
 Val Asp Thr Glu Ala Pro Arg Pro Ala Pro Lys Tyr Gln Asp Val Ser
 35 40 45
 Ser Glu Lys Pro Gln Ala Gln Lys Asp Gln Gly Gly Tyr Gly Phe Ala
 50 55 60
 Met Arg Phe Lys Arg Arg Asn Trp His Pro Ser Ala Asn Pro Lys Glu
 65 70 75 80
 Asp Glu Val Lys Leu Lys Asn Asp Asp Trp Glu Ala Thr Gly Leu Pro
 85 90 95
 Thr Glu Pro Lys Lys Leu Pro Leu Lys Gln Gln Ser Val Ile Ser Glu
 100 105 110
 Val Glu Thr Asn Gly Asn Ser Lys Met Tyr Thr Ser Pro Tyr Leu Ser
 115 120 125
 Gln Asp Ala Asp Ser Ser His Ala Asn Gly Ala Asn Gln Pro Lys Asn
 130 135 140
 Glu Val Thr Asp Tyr Lys Lys Phe Lys Tyr Val Tyr Ser Gly Trp Phe
 145 150 155 160

Tyr Lys His Ala Lys Ser Glu Val Lys Asn Glu Asn Gly Leu Val Ser
 165 170 175
 Ala Lys Arg Gly Asp Asp Gly Tyr Ile Phe Tyr His Gly Asp Lys Pro
 180 185 190
 Ser Arg Gln Leu Pro Ala Ser Glu Ala Val Thr Tyr Lys Gly Val Trp
 195 200 205
 His Phe Val Thr Asp Thr Lys Gln Gly Gln Lys Phe Asn Asp Ile Leu
 210 215 220
 Glu Thr Ser Lys Gly Gln Gly Asp Lys Tyr Ser Gly Phe Ser Gly Asp
 225 230 235 240
 Glu Gly Glu Thr Thr Ser Asn Arg Thr Asp Ser Asn Leu Asn Asp Lys
 245 250 255
 His Glu Gly Tyr Gly Phe Thr Ser Asn Phe Lys Val Asp Phe Asn Asn
 260 265 270
 Lys Lys Leu Thr Gly Lys Leu Ile Arg Asn Asn Lys Val Ile Asn Thr
 275 280 285
 Ala Ala Ser Asp Gly Tyr Thr Thr Glu Tyr Tyr Ser Leu Asp Ala Thr
 290 295 300
 Leu Arg Gly Asn Arg Phe Ser Gly Lys Ala Ile Ala Thr Asp Lys Pro
 305 310 315 320
 Asn Thr Gly Gly Thr Lys Leu His Pro Phe Val Phe Asp Ser Ser Ser
 325 330 335
 Leu Ser Gly Gly Phe Phe Gly Pro Gln Gly Glu Glu Leu Gly Phe Arg
 340 345 350
 Phe Leu Ser Asp Asp Gly Lys Val Ala Val Val Gly Ser Ala Lys Thr
 355 360 365
 Lys Asp Ser Thr Ala Asn Gly Asn Ala Pro Ala Ala Ser Ser Gly Pro
 370 375 380
 Gly Ala Ala Thr Met Pro Ser Glu Thr Arg Leu Thr Thr Val Leu Asp
 385 390 395 400
 Ala Val Glu Leu Thr Pro Asp Gly Lys Glu Ile Lys Asn Leu Asp Asn
 405 410 415
 Phe Ser Asn Ala Thr Arg Leu Val Val Asp Gly Ile Met Ile Pro Leu
 420 425 430
 Leu Pro Thr Glu Ser Gly Asn Gly Gln Ala Asp Lys Gly Lys Asn Gly
 435 440 445
 Gly Thr Asp Phe Thr Tyr Glu Thr Thr Tyr Thr Pro Glu Ser Asp Lys
 450 455 460
 Lys Asp Thr Lys Ala Gln Thr Gly Ala Gly Gly Met Gln Thr Ala Ser
 465 470 475 480

Gly Thr Ala Thr Val Asn Gly Gly Gln Val Gly Thr Lys Thr Tyr Lys
 485 490 495
 Val Gln Val Cys Cys Ser Asn Leu Asn Tyr Leu Lys Tyr Gly Leu Leu
 500 505 510
 Thr Arg Glu Asn Asn Asn Ser Val Met Gln Ala Val Lys Asn Ser Ser
 515 520 525
 Gln Ala Asp Ala Lys Thr Lys Gln Ile Glu Gln Ser Met Phe Leu Gln
 530 535 540
 Gly Glu Arg Thr Asp Glu Asn Lys Ile Pro Gln Glu Gln Gly Ile Val
 545 550 555 560
 Tyr Arg Gly Phe Trp Tyr Gly Arg Ile Ala Asn Gly Thr Ser Trp Ser
 565 570 575
 Gly Lys Ala Ser Asn Ala Thr Asp Gly Asn Arg Ala Lys Phe Thr Val
 580 585 590
 Asn Gly Asp Arg Lys Glu Ile Thr Gly Thr Leu Thr Ala Glu Asn Arg
 595 600 605
 Ser Glu Ala Thr Phe Thr Ile Asp Ala Met Ile Glu Gly Asn Gly Phe
 610 615 620
 Lys Gly Thr Ala Lys Thr Gly Asn Asp Gly Phe Ala Pro Asp Gln Asn
 625 630 635 640
 Asn Ser Thr Val Thr His Lys Val His Ile Ala Asn Ala Glu Val Gln
 645 650 655
 Gly Gly Phe Tyr Gly Pro Asn Ala Glu Glu Leu Gly Gly Trp Phe Ala
 660 665 670
 Tyr Pro Gly Asn Glu Gln Thr Lys Asn Ala Thr Val Glu Ser Gly Asn
 675 680 685
 Gly Asn Ser Ala Ser Ser Ala Thr Val Val Phe Gly Ala Lys Arg Gln
 690 695 700
 Lys Leu Val Lys
 705

<210> 29
 <211> 280
 <212> DNA
 <213> *Moraxella catarrhalis*

<400> 29
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 acaagtgcta aacattcgag acttaacacg ctatgaccct ggcattgctg tggttgagca 120
 aggtcgtggg gcaagctcag gctattctat tcgtggtatg gataaaaatc gtgtggcggg 180
 attggttgat ggcattcaatc aagcccagca ctatgcccta caaggccctg tggcaggcaa 240
 aaattatgcc gcaggtgggg caatcaacga aatagaatac 280

<210> 30
 <211> 7
 <212> PRT
 <213> Moraxella catarrhalis

<400> 30
 Glu Gly Gly Phe Tyr Gly Pro
 1 5

<210> 31
 <211> 10
 <212> PRT
 <213> Moraxella catarrhalis

<400> 31
 Ile Arg Asp Leu Thr Arg Tyr Asp Pro Gly
 1 5 10

<210> 32
 <211> 30
 <212> DNA
 <213> Moraxella catarrhalis

<400> 32
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<210> 33
 <211> 30
 <212> DNA
 <213> Moraxella catarrhalis

<400> 33
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<210> 34
 <211> 32
 <212> DNA
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<400> 34
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<210> 35
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 <212> DNA
 <213> Moraxella catarrhalis

<400> 35
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<210> 36
 <211> 56

<212> DNA

<213> Moraxella catarrhalis

<400> 36

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<210> 37

<211> 58

<212> DNA

<213> Moraxella catarrhalis

<400> 37

acacaccacc gtcaccacca agtttaggtg gacgaggatg cgggtaaggt ttacgatc 58

<210> 38

<211> 104

<212> DNA

<213> Moraxella catarrhalis

<400> 38

gtccaaatgc aaacgagatg ggcgggtcat ttacacacaa cgccgatgac agcaaagcct 60
ctgtggtctt tggcacaaaa agacaacaag aagttaagta gtag 104

<210> 39

<211> 105

<212> DNA

<213> Moraxella catarrhalis

<400> 39

gtttacgttt gctctacccg cccagtaaat gtgtgttgcg gctactgtcg tttcggagac 60
accagaaacc gtgtttttct gttgttcttc aattcatcat cctag 105

<210> 40

<211> 113

<212> DNA

<213> Moraxella catarrhalis

<400> 40

tatgaaacac attcctttta ccacactgtg tgtggcaatc tctgccgtct tattaaccgc 60
ttgtggtggc agtgggtggtt caaatccacc tgctctacg cccattccaa atg 113

<210> 41

<211> 115

<212> DNA

<213> Moraxella catarrhalis

<400> 41

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caccaccgtc accaccaagt ttaggtggac gaggatgcgg gtaaggttta cgatc 115

<210> 42

<211> 40

<212> DNA

<213> Moraxella catarrhalis

<400> 42

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<210> 43

<211> 30

<212> DNA

<213> Moraxella catarrhalis

<400> 43

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30

<210> 44

<211> 30

<212> DNA

<213> Moraxella catarrhalis

<400> 44

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30

<210> 45

<211> 2287

<212> DNA

<213> Moraxella catarrhalis

<400> 45

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caacccatca gaggattatt ttatgaaaca cattccttta accacactgt gtgtggcaat 180
ctctgccgtc ttattaaccg cttgtggtgg cagtgggtgg tcaaatccac ctgctcctac 240
gccattcca aatgctagcg gttcaggtaa tactggcaac actggtaatg ctggcggtac 300
tgataataca gccaatgcag gtaatacagg cggtaacaag tctggtacag gcagtgccag 360
cacgtcagaa ccaaaatata aagatgtgcc aacaacgccc aataacaaag aacaagtttc 420
atccattcaa gaacctgcc tgggttatgg catggctttg agtaaaatta atctatacga 480
ccaacaagac acgccattag atgcaaaaaa tatcattacc ttagacggtg aaaaacaagt 540
tgctgacaat caaaaatcac cattgccatt ttcgttagat gtagaaaata aattgcttga 600
tggctatata gcaaaaatga atgaagcgga taaaaatgcc attggtgaaa gaattaagag 660
agaaaatgaa caaaaataaaa aaatatccga tgaagaactt gccaaaaaaa tcaaagaaaa 720
tgtgcgtaaa agccctgagt ttcagcaagt attatcatcg ataaaagcga aaactttcca 780
ttcaaatgac aaaacaacca aagcaaccac acgagattta aaatatgttg attatggtta 840
ctacttggtg aatgatgcca attatctaac cgtcaaaaca gacaaaccaa aactttggaa 900
ttcaggtcct gtgggcggtg tgttttataa tggctcaacg accgccaaag agctgcccac 960
acaagatgcg gtcaaatata aaggacattg ggactttatg accgatgttg ccaaaaaaag 1020
aaaccgattt agcgaagtaa aagaaacctt tcaagcaggc tgggtggtatg gggcatcttc 1080
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gctgtttagt aacctacaag acagccataa acaaaaagta accaaaacaa aacgctatga 1260
tattaaggct gatatccacg gcaaccgctt ccgtggcagt gccaccgcaa cggataaggc 1320
agaagacagc aaaagcaaac acccctttac cagccatgcc aaagataagc tagaagggtg 1380
tttttatgga ccaaaaggcg aggagctggc aggtaaattc ttaaccgatg ataacaaact 1440
ctttggtgtc tttggtgcc aacaagaggg taatgtagaa aaaaccgaag ccatcttaga 1500
tgcttatgca cttgggacat ttaataaacc tggtagacc aatccgcct ttaccgctaa 1560
cagcaaaaaa gaactggata actttggcaa tgccaaaaag ttggtcttgg gttctaccgt 1620
cattgatttg gtgcctactg atgccaccaa agatgtcaat gaattcaaag aaaagccaaa 1680
gtctgccaca acaaaagcgg gcgaaacttt gatggtgaat gatgaagtta gcgtcaaaac 1740

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ctatggcaaa aactttgaat acctaaaatt tggtagactt agtgtcgggt gtagccatag 1800
cgtcttttta caaggcgaac gcaccgctac cacaggcgag aaagccgtac caaccacagg 1860
caaagccaaa tatttgggga actgggtagg atatataca ggagcggact catcaaaagg 1920
ctctaccgat ggcaagggt ttaccgatgc caaagatatt gctgattttg acattgactt 1980
tgagaaaaaa tcagttaatg gcaaaactgac caccaaagac cgccaagacc ctgtctttta 2040
catcacaggt gaaatcgag gcaatggctg gacaggtaaa gccagcaccg ccgaagcgaa 2100
cgcagggggc tataagatag attctagcag tacaggcaaa tccatcgta tcaaagatgc 2160
cgtgggttaca ggtggctttt atggtccaaa tgcaaccgag atgggtgggt catttacaca 2220
caacagcggg aatgatggta aagtctctgt ggtctttggc acaaaaaaac aagaagttaa 2280
gaagtga                                           2287

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<210> 46
<211> 2145
<212> DNA
<213> Moraxella catarrhalis

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<213> Moraxella catarrhalis

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Asn	Val	Arg	Lys	Ser	Pro	Glu	Phe	Gln	Gln	Val	Leu	Ser	Ser	Ile	Lys	195	200	205	
Ala	Lys	Thr	Phe	His	Ser	Asn	Asp	Lys	Thr	Thr	Lys	Ala	Thr	Thr	Arg	210	215	220	
Asp	Leu	Lys	Tyr	Val	Asp	Tyr	Gly	Tyr	Tyr	Leu	Val	Asn	Asp	Ala	Asn	225	230	235	240
Tyr	Leu	Thr	Val	Lys	Thr	Asp	Lys	Pro	Lys	Leu	Trp	Asn	Ser	Gly	Pro	245	250	255	
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Thr	Gln	Asp	Ala	Val	Lys	Tyr	Lys	Gly	His	Trp	Asp	Phe	Met	Thr	Asp	275	280	285	
Val	Ala	Lys	Lys	Arg	Asn	Arg	Phe	Ser	Glu	Val	Lys	Glu	Thr	Tyr	Gln	290	295	300	

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 His Ser Ser Glu Phe Thr Val Asn Phe Lys Glu Lys Lys Leu Thr Gly
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 Glu Leu Phe Ser Asn Leu Gln Asp Ser His Lys Gln Lys Val Thr Lys
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 Thr Lys Arg Tyr Asp Ile Lys Ala Asp Ile His Gly Asn Arg Phe Arg
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Asn Gly Trp Thr Gly Lys Ala Ser Thr Ala Glu Ala Asn Ala Gly Gly
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Tyr Lys Ile Asp Ser Ser Ser Thr Gly Lys Ser Ile Val Ile Lys Asp
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ai
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